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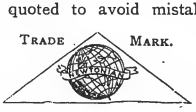

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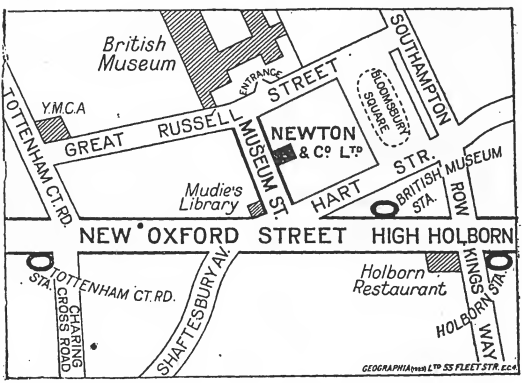

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7 ,, Side view.
8 Vickers "Viget" Single Seater Light Aeroplane.
9 Vickers "Viking" Amphibian. Front view.
10 ,, Side view.
11 ,, Two machines.

MILITARY AIR-CRAFT.

12 Ambulance. Vickers "Vimy." Twin 450 h.p. Napier "Lion" Engines.
13 Ambulance. Vickers "Vimy" showing an ambulance case. Twin 450 h.p. Napier "Lion" Engines.
14 Ambulance. Vickers "Vimy." Twin 450 h.p Napier "Lion" Engines.
15 Vickers "Viking" Military Amphibian. 450 h.p. Napier "Lion" Engines.
16 Vickers "Vulture" Amphibian. 450 h.p. Napier "Lion" Engine. (Sqdn. Ldr. MacLaren's machine.)
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18 Vickers "Vimy" Trans-Atlantic Flight Aeroplane. Twin 350 h.p. Rolls Royce "Eagle" Engines.
19 Vickers "Vimy" Trans-Atlantic Flight Aeroplane. Twin 350 h.p. Rolls Royce "Eagle" Engines. (The start from St. John's, Newfoundland, 14th June, 1919.)
20 Vickers "Virginia" Long Distance Heavy Night Bomber. Twin 450 h.p. Napier "Lion" Engines. Front view.
21 ,, Side view.
22 ,, Back view.
23 ,, and the Vickers "Viget" Single Seater Light Aeroplane.
24 Vickers "Virginia" Bomber. (Left of picture). Vickers "Viget" Single Seater Light Aeroplane (centre) and Vickers "Vimy" Bomber (right of picture).

GENERAL PURPOSE. (RECONNAISSANCE AND DAY BOMBERS.)

25 Vickers "Vixen V" Military Two Seater. 450 h.p. Napier "Lion" Engine.
26 Vickers "Vixen" military Two Seater. 450 h.p. Napier "Lion" Engine. Side view.

SEAPLANE.

27 Vickers "Vixen III" Seaplane. Two Seater Reconnaissance and Day bomber. 450 h.p. Napier "Lion" Engine.

SCOUT. SINGLE SEATER.

28 Vickers "Wibault" All Metal Fighter. Single Seater. 450 h.p. Bristol "Jupiter" Engine.
29 ,, Side view.

TROOP CARRIERS.

30 Vickers "Vernon" 14-seater Troop Carrier. Twin 450 h.p. Napier "Lion" Engines.
31 ,, Side view.
32 Vickers "Victoria" 24 seater Troop-Carrier. Twin 450 h.p. Napier "Lion" Engines.
33 ,, ,,

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5 Atlantic H.P. in flight. 4 engines. 1,440 h.p. Rolls.
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7 Exterior of H.F. W. 8. 2 engines. 730 h.p. Rolls.
8 Interior of H.P. W. 8. 14 seats.
9 Exterior of H.P. Hamilton. 3 engines. 1,360 h.p. Rolls. 2 h.p. Puma.
10 Exterior of H.P. Hampstead 3 engines.
11 Interior of H.P. Hampstead. 14 seats.
12 Exterior of Vulcan Vanguard. 2 engines (Rolls Condors), 1,200 h.p.
13 Interior of Vulcan Vanguard. 2 engines. 22 seats.
14 Interior of Vulcan Vanguard. Laid for Lunch.
15 Interior of Vulcan Vaoguard. Passengers having lunch.
16 Exterior of Vulcan. Single engine. 8 seats.
17 Exterior of D.H. 50. Single engine. 4 seats for special flights.
18 Imperial Airways machine in flight.
19 4 Engine H.P. in flight.
20 Parachute leaving an Aeroplane.

AEROPLANES—*Continued.*

21 Hampstead Heath on Bank Holiday from an Imperial Airways Aeroplane.
22 Hampstead Heath, Spaniards Road, from an Imperial Airways Aeroplane.
23 Aerial view of Croydon Aerodrome.
24 View of Public Enclosure.
25 Imperial Airways Aeroplane Hanger Entrance.
26 Group of inspectors and charge hands.
27 Close up view of wings of Imperial Airways Aeroplane.
28 Plane before being covered with fabric.
29 Inspector examining Tail Plane.
30 Close up view of Fuselage of machine from rear.
31 Close up view of Fuselage of machine, not covered with fabric.
32 Shock Absorber of undercarriage.
33 Cockpit of Imperial Airways Aeroplane.
34 Pilots Instrument Board.
35 Rolls Royce Aeroplane Engine. 360 h.p.
36 Engine being lifted by crane.
37 Installing Engine.
38 Engine Overhaul and Repairing Shop.
39 Portion of Engine Shop.
40 Parts of Rolls Royce Engine.
41 Inspection Bench.
42 Engine Assembly Shop.
43 Napier engine and testing bed.
44 Electrical fuses and switch boxes by testing bed.
45 Engine on test.
46 Meteorological Department.
47 Weather Report Board.
48 Aerial and Wireless Cabins.
49 Inside of the Wireless Cabin.
50 Direction finding Map.
51 Control Tower.
52 Control Tower and Aerodrome Buildings. (Customs, Passport Office, Freight Sheds and Examination Sheds).
53 Inside of Control Tower.
54 Pilot wearing Wireless Equipment.
55 Lighthouse.
56 Neon Light Masts.
57 Compass Base. Aeroplane in position.
58 His Majesty the King, the Prince of Wales and Duke of York watching an experimental flight.
59 H.R.H. the Prince of Wales as an Aviator.
60 H.R.H. the Prince of Wales and the Pilot ready for a flight with Mr. Handley Page.
61 H.R.H. the Prince of Wales in cockpit of a machine
62 Sir Eric Geddes, Mr. Handley Page and Major Wood-Humphrey.
63 Passenger Car loading at Hotel Victoria.
64 Imperial Airways Office, Exterior. Croydon.
65 Passengers arriving at Croydon.
66 Interior of Passengers' Waiting Room.
67 Trust House Hotel.
68 Interior of Restaurant. Trust House.
69 Interior of Freight Shed.
70 Freight prior to loading on Machine.
71 Freight being loaded on Machine.
72 Mails arriving and being loaded into Machine.
73 Load sheet.
74 Passengers embarking on Machine.
75 Passengers on Machine.
76 Machine taxi-ing off.
77 Machine taking off.
78 Machine in clouds.
79 Over Crystal Palace.
80 Lympne Aerodrome.
81 Hythe.
82 Folkestone Jetty.
83 Folkestone Jetty and Dover Cliffs.
84 Tramp Steamer in Straits of Dover.
85 Pilot and Mechanic crossing Channel.
86 Boulogne.
87 Paris—Plage-de-Tourquet.
88 French Coast near Etaples.
89 Abbeville.
90 Beauvais.
91 French Village near Paris.
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14 Complete Fuselage.
15 Two-engine Handley Page with Folded Wings.
16 Side View of the two-engine Handley Page.
17 Three-quarters Front View of the Two-engine Handley-Page.
18 Three-quarters Rear View of the Two-engine Handley-Page.
19 Full Front View.
20 Result of Shell Fire.
21 Result of Shell Fire.
22 Result of Shell Fire.
23 Hoisting Mail on Board Handley-Page Government Service Machine.
24 Interior of Handley-Page Machine known as " Ferry Bus."
25 Interior of Handley-Page Machine known as " Ferry Bus."
26 Interior of Handley-Page Machine known as " Ferry Bus."
27 H.M. Air Liner " Great Britain," Two-engine Handley-Page.
28 Interior of above.
29 H.M. Air Liner " Silver Star."
30 Interior of above.
31 Interior of Handley-Page Two-engine Passenger Machine.
32 Full Front View of Four-engine Handley-Page.
33 Three-quarter Front View of above.
34 Side View of above.
35 Four-engine Handley-Page with Folded Wings.
36 Four-engine Handley-Page with Folded Wings.
37 Four-engine Handley-Page with Folded Wings.
38 View of Handley-Page Works and Aerodrome from the Air.
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9 Section of an inclined valve engine.
10 Enfield. Allday valve engine.
11 A.B.C. horizontally opposed air cooled twin cylinder engine
12 Engine—monobloc construction
13 High efficiency pistons, Buchanan employ and Ricardo
14 Methods of valve lifting
15 Section of typical four-cylinder engine
16 Section of high efficiency engine
17 Section through a high-efficiency eight cylinder Vee engine
18 Lancier twelve cylinder engine
19 Chart showing firing intervals
20 Connecting rods and pistons of Enfield Allday engine
21 Four-cylinder engine with head removed
22 Two systems of engine lubricating
23 Gear Wheel Pump, section
24 System of Lubrication
25 Lubrication, trough system
26 Types of carburetter
27 Systems of petrol feed
28 Water Cylinder
29 Three types of aero-engines for motors. Isotta-Fraschini, Napier, F.A.S.T.
30 General control system.
31 High tension magnetos.
32 Wiring diagram of high tension magneto.
33 Detailed section of four-cylinder magneto.
34 Section of high-tension magneto.
35 Details of coils. Commutators and Sparking Plugs.
36 Diagram of electrical systems used on a car.
37 Section of slotted armature core.
38 Wiring diagram. C.A.V. System.
39 Various types of Power Starters.
40 Systems of electrically driven vehicles.
41 Plan of Chassis—steam driven car.
42 System of various clutches.
43 Types of gear boxes.
44 System of gear box mounting.
45 Types of universal joints on axle drive.
46 System of bevel drives.
47 Stress Drives.
48 Types of bearings.
49 Gear control.
50 Location of controls.
51 Brake system.
52 Four phases of operations in an internal combustion engine.
53 Wheel alignment test.

See also "The Motor Car Industry," page 844. For the early history of Motor Cars and Road Engines, see "The Steam Engine, Motors, etc.," page 817.

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1 Fig. 1 Ackermann Front Steering.
Fig. 2 Four-wheel Steering: Non-symmetrical
,, 3 Four-wheel Steering: Symmetrical.
2 ,, 4 Path of Wheels in 180 Side-slip.
3 ,, 5 M. & S. Differential.
4 ,, 6 Walter Automatic-locking Differential.
5 ,, 8 F.W.D. Chassis; Skeleton Plan.
6 ,, 9 F.W.D. Chassis; Front Axle.
7 ,, 19 Walter Super-quad; Plan and Elevation.
8 ,, 20 ,, ,, Tractor.
9 ,, 21 ,, ,, Transmission.
10 ,, 22 Transmission and Wheel-drive.
11 ,, 28 Jeffery Quad; Applications.
12 ,, 29 Couple-gear; Electric Truck.
13 ,, 30 ,, ,, Petrol-electric Truck.
14 ,, 33 ,, ,, Diagram of Tractive Effort and Speed of Motor.
15 ,, 37 Wheel and Chain-track compared.
16 ,, 38 Boydell Girdle.
17 ,, 39 Heavy Transport Girdle.
18 ,, 40 Pedrail; Early Form (Diplock).
19 Fig. 41 Supporting Wheels with Axles fixed Relatively to Truck-Frames (Creeping-Grip).
20 ,, 42 Chain-track with Secondary Chain of Travelling Rollers. (Centiped).
21 ,, 45 Modern Pedrail; Foot and Rail (Diplock).
22 ,, 46 Chain-track with Rows of Travelling Balls (Yuba).
23 ,, 47 ,, partly Spring-supporting. (Caterpillar).
24 ,, 48 ,, totally Spring-Supporting over Effective Length. (Clayton).
25 ,, 49 ,, Frame with Pivotal-Springing about Back axle (Track-layer).
26 ,, 50 ,, Frame with Pivotal-Springing about End Bearing (Strait).
27 ,, 51 Multiple-articulated Truck-frame (Caterpillar).
28 ,, 52 Roberts Tractor; Side View.

MOTOR TRACTION OVER ROUGH LANDS—*Continued.*

29 Fig. 53 Sprocket Design to allow for wear of Chain (Hans Renold).
30 .. 54 Roller-Chain for Pedrail (Diplock).
31 ,, 55 Torque and Horse-Power Curves for Motors.
32 ,, 73 . Tractor-truck (Allis-Chalmers).
33 ,, 86 Caterpillar; 75 h.p. Side Elevation.
34 ,, 87 ,, 75 h.p. Transmission, Plan.
35 ,, 88 ,, 75 h.p. End View.
36 ,, 89 ,, 45 h.p. Side Elevation.
37 ,, 90 ,, 45 h.p. Transmission, Plan.
38 ,, 91 ,, 18 h.p. Side Elevation and Detail of Three-Point Suspension.
39 ,, 95 Clayton 110 h.p. Tractor, Truck-Frame and Details.
40 ,, 96 ,, ,, ,, Front Wheel and Steering Gear.
41 ,, 97 ,, ,, ,, Section through Fore-carriage.
42 ,, 98 ,, ,, ,, Friction Clutch and Coupling.
43 ,, 99 ,, ,, ,, Change-gear and worm-box.
44 ,, 100 ,, 35 h.p. ,, Elevation and Plan.
45 ,, 105 Creeping-Grip, Senior. 50 h.p. Detail of Track-frame and Drive.
46 ,, 106 ,, ,, ,, 50 h.p. Side Elevation.
47 ,, 103 Strait Tractor; Model 3. End View.
48 ,, 142 Scott Motor-Sleigh.
49 ,, 160 Hedgeland Axle.
50 ,, 161 Free-wheel Type Axle.
51 ,, 162 Cam and Roller Type Axle.
52 ,, 163 Eccentric and Connecting Rod Type of Differential.
53 Table 1 Four-wheel Driven Vehicles.
54 ,, 2 Chain-Track Tractors.
55 ,, 2 Chain-Track Tractors.
56 ,, 2 Chain-Track Tractors.
57 ,, 3 Chain-Track Tractors. Schedule of time worked and acreage ploughed.
58 ,, 4 Wheeled Tractors.
59 Fig. 7 Dorr-Miller Automatic-locking Differential.
60 ,, 10 F W D Centre Differential and Locking-levers
61 ,, 11 F W D Transmission Phantom view.
62 ,, 12 3-ton chassis.
63 ,, 13 Side-tip wagon.
64 ,, 14 Front Axle.
65 ,, 15 F.W.D. 3-ton Truck. Carrying Ore over Sand, Utah.
,, 16 ,, ,, On a Sea of Alkali - mud (70 miles from base).
66 ,, 17 Hauling Industrial Railway Vans.
67 ,, 18 F.W.D. End-tip Wagon.
68 ,, 23 Walter Super-Quad; inverted view—wheels straight.
,, 24 ,, ,, inverted view—wheels locked.
69 ,, 25 Walter Automatic-locking Differential.
70 ,, 26 Jeffery Quad; Tractor Chassis.
,, 27 ,, ,, ; Plan View of Chassis.
71 ,, 31 Wheel. (Couple-gear) complete but without tyre.
,, 32 Wheel. Details showing Motor.
72 ,, 34 Petrol-electric Truck with Load.
73 ,, 35 Petrol-electric Truck, Power Plant. (Couple-gear).
74 ,, 36 Petrol-electric. Fire-escape.
75 ,, 43 Chain-Track of Log-Hauler. (Phoenix).
,, 44 Track Detail; Modern Pedrail. (Diplock).
,, 45 Rocker-pin of Tracklayer. (Bes.).
,, 56 Track-shoe. Pressed-steel.
,, 57 Track-shoe of Steel-casting; one-piece.

Fig. 76 ,, 59 Log-Hauler. With Runners for Steering.
,, 60 ,, ,, Track-detail and Drive, showing Engine.
,, 61 ,, ,, Showing small Ground-clearance for snow.
77 ,, 62 Log-Hauler. Showing relative width of Engine and Sleigh-tracks.
,, 63 ,, ,, With Load of Sawn Timber.
78 ,, 64 View of 420-ton Train of Logs.
79 ,, 65 Log-Hauler; on Curve.
80 ,, 66 Centiped Truck.
,, 67 ,, ,, Hauling Wagons on Soft Sand.
81 ,, 68 Centiped. Crossing Ditch.
,, 69 ,, ,, Crossing Railway Track.
82 ,, 70 Detail of Track.
83 ,, 71 Centiped; Ploughing 30-inch Furrow.
84 ,, 72 Centiped; Road-grading.
,, 74 Caterpillar; 120 h.p.
85 ,, 75 Caterpillar. 45 h.p.
,, 76 ,, ,, 75 h.p.
86 ,, 77 Caterpillar. 45 h.p. Truck Assembly.
,, 78 ,, ,, 18 h.p. with Track laid out.
,, 79 ,, ,, 18 h.p. view from above.
87 ,, 80 Caterpillar. 18 h.p.
88 ,, 81 Caterpillar. Cultivating and Harrowing.
,, 82 ,, ,, Hauling Ditcher.
89 ,, 83 Caterpillar. Working for White Pass and Yukon Railroad.
,, 84 ,, ,, Hauling Logs on Sleigh.
90 ,, 85 Caterpillar. Clearing Snow at Butte, Montana.
91 ,, 92 Clayton. 110 h.p. Tractor.
92 ,, 93 ,, ,, Hauling Test Load.
93 ,, 94 ,, ,, On 40 Gradient; front wheel off the ground.
,, 101 Tracklayer; 90 h.p.
94 ,, 102 Tracklayer; 30 h.p.
,, 103 Detail of Differential and Drive-sprockets.
95 ,, 104 Ploughing in Reeds, California.
96 ,, 107 Creeping-Grip. "Senior": 50 h.p.
,, 108 ,, ,, "Baby" 16 h.p.
,, 109 ,, ,, "Baby" 16 h.p. Cultivating.
97 ,, 110 Creeping-Grip; Truck.
,, 111 ,, ,, and Wheels.
98 ,, 112 Austin Tractor; 35 h.p.
99 ,, 113 Austin Tractor; 15 h.p.
100 ,, 114 Burford-Cleveland Tractor.
101 ,, 115 Burford-Cleveland Tractor. Hauling Ploughs
102 ,, 116 Strait Tractor; Front view, showing Steering-track.
103 ,, 117 Strait Tractor. Model 3, Single-track Tractor; Deep Ploughing.
,, 118 ,, ,, Detail of Track-frame.
104 ,, 119 Strait Tractor. Side View.
105 ,, 120 ,, ,, Hauling a House on a dirt road.
106 ,, 121 Strait Tractor. Ploughing in old sod.
107 ,, 122 Model 3. Side View.
108 ,, 124 Yuba Tractor. Side view.
,, 125 ,, ,, Detail of Track.
109 ,, 126 Disking and Harrowing.
110 ,, 127 Yuba Tractor. Section of Track.
,, 128 ,, ,, Detail of Track.
111 ,, 129 Yuba Tractor. Detail of Gear-Box.
112 ,, 130 Yuba Tractor. Hauling Harvester.
,, 131 ,, ,, Hauling 40 ft. Corrugated Roller in Bean-land.
113 ,, 132 Yuba Tractor. Climbing a 65 per cent. gradient.
114 ,, 133 ,, ,, Fitted with Hard-pan Driller.
115 ,, 134 Yuba Tractor. On Side-lying ground in Orchard.
,, 135 ,, ,, Climbing out of Irrigation Ditch.
,, 136 Harvesting Rice.

MOTOR TRACTION OVER ROUGH LANDS—*Continued.*

116 Fig. 137 } Martin Cultivator. Two-Plough.
„ 138 } „ „ With steering Wheels.
„ 139 } „ „ With Three-furrow Plough.
117 „ 140 } Martin Cultivator. Ploughing.
„ 141 } „ „ Hauling.
118 „ 143 } Scott Motor-Sleigh; on ground.
„ 144 } „ „ on Blocks showing Chain Sag.
119 „ 145 } Scott Motor-Sleigh; climbing a slope.
„ 146 } „ „ Test on Lake Fefor, Norway.
120 „ 147 Lefebvre Tractor; 45 h.p.;
121 „ 148 } Caterpillar with Train of Chain-track Haulage Wagons.
„ 149 } „ „ with Chain-track Haulage Wagons.
122 Fig. 150 } Pedrail Haulage Wagon.
„ 151 } „ „ Wagon with Chain-track laid out.
123 „ 152 Parsons' Model 60 Ditcher; Side View.
124 „ 153 } „ „ 48 Ditcher; Front View
125 „ 154 } „ „ 24 Ditcher; Back view.
126 „ 155 Austin Ditcher; Digging 10 feet deep, 27 inches wide.
127 „ 153 } „ „ with Bank-sloping Device; Digging 5ft. deep 3 ft. bottom, 1 to 1 slope.
„ 157 Parsons' Back Filler.
128 „ 158 Renard Road Train with 20-ton load crossing swampy field.
129 „ 159 „ „ Chassis connected

AES STEEL MAKING UP TO DATE.

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3 Interior of Blast Furnace Shed, showing the tuyeres and sand laid out ready for a "pour."
4 Pouring Cast Iron into Travelling Ladle.
5 15-ton Bessemer Converter, showing its position ready to receive a charge of cast iron.
6 Converter in position for Blowing.
7 Bessemer Converter being filled with molten Cast Iron.
8 "Tipping up." The blow has to be started before the converter is tipped up to prevent the charge running into the blow holes.
9 "Tipping down," after the completion of the blowing process.
10 Pouring the De-siliconized Steel into the Travelling Ladle. From here it is taken to the open hearth furnaces where the phosphorus is removed.

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4 Paring cold rolled Steel Strip.
5 Heating Steel for Forging Shoes and Dies for Ore-crushing machinery.
6 Forging Shoes and Dies for Ore-crushing machinery.
7 Section of Machine Knife Department.
8 Another view of Machine Knife Department.
9 Sheet Rolling Mills.
10 Rod Rolling Mills.
11 Heavy Shearing Machine.
12 Rolling the Bayonet Blade Steel to required Section. Passing through finishing rolls.
13 Shearing Bayonet Blades from the rolled section to correct lengths.
14 Rolling the Bayonet Blade Steel to the required section. Final passing to correct gauge.
15 Polishing the Bayonet Blades after assembling.
16 Testing the Bayonet Blade after all operations in manufacture are completed by means of the Curve Test.
17 Striking Test of Finished Bayonets upon an Oak block. This test will find any weakness in Brazing of the Pommel or Crosspiece; quality of wooden Grips, or defect in the blade after it has passed through the various processes of manufacture.
18 File cutting machinery.
19 Wet grinding of long Saws.
20 Band Saw Shop.
21 Saw Handle Making.
22 Hacksaw Department. 3-Teeth Milling Machines.

See also "Some British Industries, page 834; "Manufacture of Iron and Steel," page 844; and "Cutlery," page 844.

AER THE BUILDING OF SALTASH BRIDGE.

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1 Shows First Piers Built (Saltash side) and First Arch (locally called tubes) in course of construction on Devon shore of River Tamar. (Copy of an old print of 1856. See type of steamboat and ferry bridge then in use on river.)
2 Shows First Arch in Place and Second Arch being Lifted into Position. This was done by means of the tide at the rate of 6 feet per week, the pier (masonry) at shore end being built up at each lift. View looks towards Saltash (Cornish side). (Copy of an old print, 1857-8.)
3 View of Bridge, taken from Saltash (Cornish side), showing Devon bank of River Tamar. See also Main Line of L. and S.W. Railway to London, which passes under Devon end of Bridge.
4 Full-length View of Bridge, looking up the River Tamar. Industrial Training Ship (Mount Edgcumbe) above bridge. Two men-of-war below idge.

See also "Bridges, Ancient and Modern," page 823.

BVC MANUFACTURES OF THE CENTRAL IRONWORKS.

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10 Light Turning Dept.
11 Heavy Turning Dept.
12 Portion of the finished Component Stores.

ELECTRIC CAPSTANS.

13 Interior of a 2 ton Electrically Driven Capstan.
14 Section of a 2 ton Electrically Driven Capstan. Diagram.
15 Plan with Lids and Bollard removed. Diagram.
16 Electric Capstans, Fairleads, etc., on Great Central Railway System, Lincoln.
17 One of an Installation of Electric Capstans and Fairleads supplied to the L. & N.W. and G.C. Joint Committee, for Oldham.
18 Diagram of Sectional Elevation. (Side.)
19 Group of Capstans, Fairleads, etc., awaiting inspection.
20 Electrically driven Warping Winch.
21 Electrically driven Hauling Gear.

STANDARD THREE MOTOR CRANES.

22 Diagram of Broadbent Standard Three-Motor Cranes.
23 Three Motor Crane. Capacity 10 Tons. Span 61 ft. 10 ins. Three-phase Alternating Current. 400 volts. 25 cycles.
24 Three Motor Crane. Capacity 12 Tons. Span 56 ft. 6 ins. Continuous Current. 220 volts.
25 Three Motor Crane. Two Cranes, one on upper and one on lower track.
Upper Track. Capacity 20 Tons. Span 81 ft. 11 ins.
Lower Track. Capacity 10 Tons. Span 77 ft. 7 ins. Three-phase Alternating Current. 350 volts. 50 periods.
26 Three Motor Crane. Capacity 14 Tons. Span 30 ft. Continuous Current. 480 volts.
27 Three Motor Crane. Capacity 15 Tons. Span 55 ft. Continuous Current 110 volts.

STANDARD FOUR MOTOR OVERHEAD CRANES.

28 Diagram of Standard Four Motor Cranes.
29 Four Motor Crane. Capacity 100 Tons. Span 36 ft. 6 ins.

STEEL WORKS' CRANES, LADLE CRANES, CHARGING MACHINES, ETC., ETC.

30 Double Bogie Ladle Crane. Capacity, Main Bogie, 30 Tons. Auxiliary Bogie, 10 Tons. Span 40 ft. Continuous Current, 220 volts.
31 Six Motor Double Bogie Ladle Crane. Capacity 100 Tons. Span 45 ft. Continuous Current, 250 volts.
32 Diagram of a Broadbent Vertical Soaking Pit Crane.
33 Diagram of a Broadbent Box Charging Machine. Overhead Type.
34 ,, Ground Type.
35 Diagram of a Broadbent Ingot Charging Machine. Overhead Type.
36 ,, Ground Type.
37 Broadbent Box Charger.

SINGLE MOTOR ELECTRIC OVERHEAD CRANES.

38 Single Motor Crane. Friction Clutch Type. Capacity 12 Tons. Span 45 ft. 6 ins.
39 Single Motor Crane. Belt Driven Type. Capacity 25 Tons. Span 57 ft.

ELECTRIC CRANES OF VARIOUS DESIGNS.

40 Electric Walking Jib Crane. Capacity, 4 Tons; Radius of Jib, 20 ft.; Number of Motors, 3; Hoisting Speed, 40 ft. per minute; Slowing Speed, 125 ft. per minute; Travelling Speed, 200 ft. per minute.
41 Electric Cantilever Crane. Capacity 2½ Tons.
42 Diagram of Electrically Driven Pedestal Crane.
43 Electrically driven fixed Derricking Crane. Capacity, 7 Tons; Radius, 17 ft.; Load Line, 7 ft.; Height of Lift, 20 ft.; Three phase Alternating Current, 400 volts, 50 periods.

HAND POWER CRANES.

44 Diagram of Broadbent Standard Hand Power Crane. Heavy Type.
45 Hand Power Overhead Crane. Capacity 25 Tons. Span 40 ft.
46 Hand Power Goliath Crane. Capacity 10 Tons. Span 42 ft. Height of Lift 21 ft.
47 Hand Power Permanent Way Crane. Capacity, 5 Tons; Radius of Jib, 15 ft.; Ground to Hook at Highest Point, 14 ft.; Gauge of Rails, 4 ft. 8½ ins.
48 Hand Power Self Supporting Jib Crane. Capacity, 1½ Tons; Radius of Jib, 15 ft.; Ground to Jib Head, 18 ft. 9 ins.

ELECTRIC OVERHEAD TRAVERSERS.

49 Electric Overhead Traverser.

STEAM CRANES.

50 Locomotive Steam Crane. Capacity, 5 Tons; Radius, 16 ft.
51 Diagram of 30 Tons Permanent Way Steam Breakdown Crane.
52 Diagram of Steam driven Pedestal Jib Crane. Capacity 10 Tons, Radius 95 ft.

BROADBENT CONTROLLERS AND RESISTANCES.

53 Standard Controller.
54 ,, Showing Contact Drum. Showing Contact Fingers—Fire-proof chambers swung back.
55 Special Controller. Special Controller (Closed.)
,, (Open).
56 Outline Drawing of Standard Controller.
57 Resistances. Standard Grid Type Resistance. Standard Wire-wound Type of Resistance.

MANUFACTURES OF THE CENTRAL IRONWORKS—*Continued.*

BROADBENT CENTRIFUGAL CLUTCHES.

58 A Type, No. 1. Centrifugal Clutch Belt Pulley (without spring control) with cover plate removed to show the Ferodo-lined friction shoes.
59 A Type, No. 6. Centrifugal Clutch Coupling to transmit 200 h.p. at 330 r.p.m. (with internal spider drawn out to show shoes and springs).
60 Diagram of a Centrifugal Clutch Belt Pulley, *without* Spring Control.
61 „ *with* Spring Control.
62 A Type, No. 5. Centrifugal Clutch applied to a Motor driving Back Gear.
63 A Type, No. 4. Centrifugal Clutch Rope Pulley (with cover plate removed to show the interior shoes).
64 Oscillograph Records.
65 Clutch combined with Belt Pulley.
66 „ „ „ Double Belt Pulley.
„ „ „ Rope Pulley.
67 Clutch combined with Pinion Gear.
„ for use as Shaft Coupling.
68 Clutch used as Coupling for Motor Extension Shaft where small diameter Pinions or Chain Sprockets are required.
69 60 h.p. 725 r.p.m. Squirrel Cage Pipe Ventilated Motor fitted with Centrifugal Clutch Coupling and Laminated Gears driving Line Shaft.
70 70 h.p. 320 r.p.m. Motor fitted with Centrifugal Clutch Coupling, driving Line Shaft in a Textile Factory.
71 30 h.p. 760 r.p.m. Motor fitted with Centrifugal Clutch combined with Spur Pinion for driving Haulage Gear.
72 88 h.p. 715 r.p.m. Motor and Speed Reduction Gear fitted with a Centrifugal Clutch Coupling driving Line Shaft in a Textile Factory.
73 Open Scutcher driven by 13 h.p. Motor fitted with Centrifugal Clutch Double Pulley.
74 Ring Frames Direct driven by 10 h.p. Motors, fitted with Centrifugal Clutch Couplings.
75 Forging Machine driven by 40 h.p. 720 r.p.m. Motor, fitted with Centrifugal Clutch Belt Pulley.
76 10 b.h.p. Totally enclosed Squirrel Cage Motor, fitted with Back Gear. 700 r.p.m. to 200 r.p.m. and Centrifugal Clutch Pinion. Second motion Shaft arranged for driving from both ends.
77 Beaters in Paper Mill driven by 55 h.p. Squirrel Cage Motors, 481 r.p.m., fitted with Centrifugal Clutch Pulleys.
78 Complete Driving Unit, fitted with Centrifugal Clutch Coupling to transmit 15 h.p. at 475 r.p.m.
79 Diagram showing the particulars required for supplying a Clutch Pulley.
80 Diagram showing the particulars required for supplying a Clutch Coupling.
81 Loom Clutch with Cover Plate removed to show the Friction Shoes.
„ „ „ on, assembled complete.
82 Loom Clutch with interior parts withdrawn to show the construction.
83 Diagram showing section of Loom Clutch combined with Steel Pinion welded to outer rim of Clutch.
84 Centrifugal Clutches For Loom Drives.
85 View from Clutch Side, with Cover Plate removed, showing Friction Shoes and Spring Bolts.
86 Diagram. Section of Ball Bearing Spring Controlled Centrifugal Clutch.
87 Diagram of Hand Controlled Centrifugal Clutch.
88 Illustration showing Automatic Centrifugal Clutch and Hand Controlled Centrifugal Clutch.
89 Diagram of Slipping Clutch Coupling combined with Centrifugal Speed Governing Brake.

CENTRIFUGAL MACHINES.

90 Diagram of Suspended Steam Driven Centrifuge.
91 Suspended direct Steam driven Centrifuge with bottom discharge.
92 „ *without* bottom discharge.
93 Diagram of a direct Electrically driven Centrifuge.
94 Suspended direct Electrically driven Centrifuge with bottom discharge.
95 Diagram of a Suspended Belt driven Centrifuge.
96 Self contained, Suspended Belt driven Centrifuge with bottom discharge.
97 Diagram of a Belt driven Centrifuge. (Over-driven Type.)
98 Over driven Belt driven Centrifuge, with central bottom discharge.
99 Suspended under driven water-driven Centrifuge with or without bottom discharge.
100 Diagram of Water driven Centrifuge. (Over-driven Type).
101 Over driven Motor driven Centrifuge with central bottom discharge.
102 Over driven Steam driven Centrifuge with central bottom discharge.
103 Over driven Electrically driven Centrifuge with central bottom discharge.
104 Diagram of a Motor driven Swan neck Type Centrifuge.
105 Over driven Swan Neck Type Motor driven Centrifuge with central bottom discharge.
106 Over driven Swan Neck Type Steam Driven Centrifuge with central bottom discharge.
107 Over driven Swan Neck Type Belt driven Centrifuge with central bottom discharge.
108 Bolted down Belt driven Dehydrating Centrifuge.
109 Bolted down direct Electrically driven Centrifuge with skimming attachment.
110 Steam Turbine Centrifugal. Grease Extractor with loose inner basket.
111 9 in. Electrically driven Laboratory Centrifuge.
112 Belt driven Analytical Centrifuge.
113 A standard Cage with Side Bottom Discharge for Under-driven Machines.
„ for Over-driven Machines.
114 Swansdown Filter Cloth for Fine Filtration.
Twill Filter Cloth for Coarser Filtration.
Fine Mesh Metal Gauze.
Coarse Mesh Metal Gauze.
115 Standard Cage Perforations.

HYDRO EXTRACTORS.

116 Suspended Belt driven Hydro Extractor (with overhead countershaft).
117 Diagram of a Self contained, Self balancing, Belt driven Hydro Extractor.
118 Self balancing Belt driven Hydro Extractor (with overhead countershaft).
119 Suspended Belt driven Hydro Extractor (with countershaft on bedplate).
120 Self contained, self balancing Belt driven Hydro Extractor. Drive "C." (with countershaft on bedplate).
121 „ Drive "A."
122 „ Drive "B."
123 Self balancing Hydro Extractor driven by separate Motor.
124 Diagram of Self contained, fixed Spindle direct Electrically driven Hydro Extractor.
125 Self contained, fixed Spindle, direct Electrically driven Hydro Extractor.
126 Belt driven, self contained Friction driven Hydro Extractor.
127 Steam Turbine Centrifugal Grease Extractor and Separator.
128 A 30 in. Perforated Copper Cage for Self Balancing Hydro Extractors. Standard Perforations for 18 in., 21 in., 26 in., 30 in., Hydro Cages. Full Size.

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24 Wire Works Warehouse.
25 A battery of Coke Ovens.
26 Coal Tar Wagons.
27 By-products Refinery.
28 A bay in a Constructional Shop.
29 A battery of high speed drilling machines.
30 A bridge span 150 ft. long.
31 One of ninety-three spans each of 100 ft. length.
32 Typical stauncheon Details.
33 Typical Girder Details.
34 Nine-Elms, London. Constructional Shops.
35 Nine-Elms, London. One of the Stock Bays.
36 Typical view in a steel frame building under construction.
37 Bush House, London, during construction.
38 Bush House, London, The Steel Frame.
39 Adelaide House, London Bridge, during erection of the steel work.
40 Adelaide House, taken during the building.
41 New East India House for Messrs. Liberty's. A photograph of the first portion
42 East India House. First section.
43 East India House, under construction.
44 Regent Street contracts. A photograph showing details of erection.
45 The Regent Palace Hotel, London.
46 Ministry of Pensions Building at Acton.
47 Mersey Dock and Harbour Board Offices, Liverpool, during construction.
48 Vickers Ltd., Factory at Erith, Kent.
49 Southern Railway. Power Station.
50 Morley House, Regent Street.
51 Liverpool-Victoria Friendly Society, Southampton Row, London. New Offices.
52 Liverpool-Victoria Friendly Society. General details of the steel-work.
53 Liverpool-Victoria Friendly Society. Details of the application of masonry to the steel-frame.
54 New Modderfontein Gold Mine. Stamp Mill.
55 The Colenso Power Station.
56 Oil Tanks abroad for the Admiralty.
57 The Bombay Pipe Line.
58 Messrs. Liebig's Refrigerator Building at Fray Bentos, Uruguay, S. America.
59 A pair of twin compound girders, 49 ft. long.
60 Bogie Rail Wagon.
61 Retiro Station, Buenos Aires.
62 Peninsular and Oriental Steam Navigation Co., Ltd. New Offices at Hong Kong.
63 S.S. "Orama."
64 Southampton. Southern Railway Company's Floating Dock.
65 Betteshanger Colliery in Kent. The Steel head frame.
66 From raw material to finished product. (Diagram.)

The Slides marked 2s. 6d. above show the ruddy glow of the molten metal.

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4 Cross-piling the ground.
5 Laying the rest blocks.
6 Laying the Keel.
7 Part of Keel Plate and Vertical Keel.
8 The Vertical Keel, near view, aft.
9 Part of Inner Bottom Framing.
10 Inner Bottom Framing showing longitudinals.
11 Inner Bottom looking forward.
12 Inner Bottom Plating and Midships Framing.
13 Midships Framing.
14 Frame and Centre Line Bulk-head.
15 At the Boiler Space, looking aft.
16 At the Boiler Space, looking forward.
17 Looking forward from the Turbine Room, showing bulk-head.
18 Above the Engine Space showing strong beams.
19 Deck Beams and Framing looking forward.
20 Framing the Fore-part.
21 View looking forward showing various Decks
22 A 'tween Deck view looking forward.
23 View of Bottom Plating.
24 Hydraulic rivetting of Ship's side.
25 The "Aquitania" ready for launching.
26 Launching the "Aquitania."
27 The "Aquitania" taking the water.
28 Towed to the Fitting-out Dock.
29 Pneumatic Machine Tool cutting side lights.
30 The "Aquitania" and the Tower Bridge.
31 The "Aquitania" and Cheapside.
32 Furnaces and Funnel in Ludgate Circus.
33 Funnel in Argyle Street, Glasgow.
34 The "Aquitania's" Coal Supply.

BVT SHIPBUILDING.

The building of the White Star Liners, "Olympic" and "Britannic," by Messrs. Harland & Wolff, Ltd., with views of their Shipbuilding and Engineering Works at Belfast.

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3 Platers' Shed, East Yard.
4 Platers' Shed, East Yard. Another view.
5 Sawmills.
6 Shipwrights' Shop.
7 Joiners' Shop.
8 Joiners' Shop. Another view.
9 Sailmakers' Shop.
10 Upholsterers' Shop.
11 Engine Erecting Shop.
12 Boiler Shop.
13 Brass Finishing Shop.
14 Tool Room. (Engine Works.)
15 Turning Shop.
16 Valve Shop.
17 Bolt Making Machine.
18 Floating Crane able to lift 150 tons.
19 Electric Generating Station.
20 Electric Generating Station. Another view.
21 Electric Machine Shop.

PLATING A SHIP.

22 General view of ship and Crane lifting plate.
23 General view from deck—plate being lowered.
24 Close up view plate from outside ship.
25 Close up view plate from deck.
26 Tank top plating. General view looking aft.
27 Engine erecting shop.

S.S. "BRITANNIC."

28 One of the Pioneer Steamers of the White Star Line. The Old "Britannic," built 1874.
29 "Britannic," 1914. Vessel at Sea.
30 Vessel fully framed.
31 Hydraulic rivetters at work on tank centre plate.
32 Longitudinal view of framing—double skin construction.
33 Framing of inner skin ready for plating.
34 Hand rivetting shell plating.
35 Hydraulic rivetter at work on topside plating.
36 Vessel fully plated.
37 Launchways under ship.
38 Davits in board.
39 Davits in Outboard with boat suspended.
40 Reciprocating engines in shop.
41 Propeller shafting in lathe.
42 Rotor partly bladed.
43 Boilers in shop.

S.S. "OLYMPIC."

44 Slipway ready steel blocks laid.
45 Vertical keel plates and floors.
46 Bird's-eye view from top of gantry showing tanks' floors.
47 Tank top and aft end frames.
48 Vessel partly framed.
49 Last frame being raised into position.
50 Rivetting proceeding on various decks.
51 Boss Arm castings.
52 View of side plating showing hydraulic rivetting.
53 Shelter deck, looking aft, showing beams and deck plating.
54 View under bottom showing launching ways and showing also hydraulic rivetting.
55 Port intermediate cylinder reciprocating engines.
56 Thrust shaft—reciprocating engines.
57 Crank shaft—reciprocating engines.
58 "Olympic" and "Titanic" in Gantries. Bird's-eye view.
59 "Olympic" and "Titanic" on stocks.
60 Rotor in lathe.
61 Portion of Turbine casing being bored.
62 Turbine Casing—End view—ready for testing.
63 The Anchor. Weight, fifteen and a half tons.
64 Turbine Casing.
65 Steering Quadrant.
66 Launch of "Olympic."
67 Promenade Deck.
68 Modern Dutch room.
69 Old Dutch room.
70 Empire Room.
71 Louis XVI Room.
72 Louis XIV Room.
73 Adams Room.
74 Regence Room.
75 Gymnasium.
76 Swimming Bath.
77 Second Class Smoke Room.
78 First Lounge.
79 First Smoke Room.
80 First Saloon.
81 Palm Court.
82 Restaurant.
83 Reading and Writing Room.
84 "Olympic" at sea.

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4 Lobby and Entrance to the Social Lounge.
5 Social Hall.
6 Winter Garden.
7 " " and Dance Hall.
8 Dining Room. 1st Class.
9 Swimming Bath.
10 Corner of Smoking Room.
11 Gymnasium.
12 Bank and Depository.
13 Dining Room of Private Suite.
14 Bedroom of Private Suite.
15 2nd Class Dining Room.
16 2nd Class Social Hall.
17 2nd Class Smoking Room.
18 2nd Class Cabin.
19 2nd Class Promenade Deck.
20 Tourist's Cabin.
21 " " Social Lounge.
22 " " Dining Saloon.
23 " " Deck Space.
24 The Wireless Room.
25 Wireless Locator.
26 A Life Saving Launch fitted with wireless.
27 The Fire Alarm Indicator.
28 "Sperry"—Gyroscopic Compass.
29 The Stern of the "Majestic" and the Bows of the "Leviathan" showing height.
30 The Bows showing height.

VZ THE EVOLUTION OF AN IRONCLAD.

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3 The first use of Ironclads. The French Floating Batteries bombarding Kirburn with impunity. October 17th, 1855.
4 The first sea-going Ironclad: The French vessel "Gloire," launched 1860.
5 Our first Ironclad: The Frigate "Warrior," launched 1861.
6 The first British Warship with complete armour-belt: H.M.S. "Achilles," 1861.
7 The first Central or Box-Battery Ship: H.M.S. "Bellerophon," built 1866.
8 The Formidable Ram: The Austrian Flag-ship "Ferdinand Max" ramming and sinking the Italian Armoured Frigate "Rè D'Italia" at the Battle of Lissa, July 20th, 1866.
9 Naval Progress from the earliest times, and the action which revolutionized the Modern System of Battleship Construction. The first Action between Ironclads: The Great Naval Duel between the "Monitor" and the "Merrimac," March 9th, 1862.
10 Our first Turret Ship: The "Royal Sovereign," as remodelled in consequence of the "Monitor"-"Merrimac" duel, 1862.
11 H.M.S. "Devastation," armed with 4 25-ton guns, two in each turret, launched 1872.
12 The last Broadside Battleship in the British Navy: H.M.S. "Alexandra," launched 1875.
13 The first Citadel ship, and the last to carry muzzle-loading rifle guns and iron armour; H.M.S. "Inflexible" at the Bombardment of Alexandria.
14 H.M.S. "Royal Sovereign."
15 The "King Edward VII."
16 The first real test of Modern Ironclads in Action: The Battle of the Yalu River, 1894.

Slides of any Modern British Ship can be supplied if desired.

AWD WORK IN AN ORDNANCE AND SHIPBUILDING YARD.

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1 Building a Dreadnought. Girders fixed ready for Deck Plates.
2 " " Laying lower Deck Plates.
3 " " Laying Deck Plates, showing cavity for Barbette.
4 " " Rivetting at work.
5 Launching a Dreadnought. The Hull taking the water.
6 Launching a Japenese Dreadnought, showing Doves liberated from the Bows.
7 Fitting-out Basin, showing Warships having Guns and Machinery fitted.
8 Turbine Propelling Machinery in erecting pits.
9 Workshops, showing the construction of Reciprocating Propeller Machinery.
10 Complete Turbine Engines for Dreadnoughts.
11 Testing Turbine Engines for Dreadnoughts.
12 Hydraulic Forging Press operating upon large hollow Marine Shaft.
13 Steel Melting House, showing Ingot being cast for a big Gun Tube.
14 10,000-tons Hydraulic Forging Press in action, forging a Gun Jacket.
15 Gun-hardening and Building Plant.
16 Interior of Gun Shop, large Gun being turned.
17 A group of finished Guns ready for mounting.
18 Gun Mountings in course of erection in Gun Fits.
19 Gun Mounting Erecting Shops under Final Inspection after Firing Trials.
20 Large Guns in the Barbette of Battleship.
21 The Working Chamber in the Turret of a Barbette of a Dreadnought.
22 In the Armour-Plate Planing Shop. Men working Machinery Planing Sheets.
23 Men Rolling Armour Plate through the Rolling Mill.
24 Hydraulic Press operating upon Armour Plate.
25 Making Caissons of Armour Plate for Dreadnoughts.
26 Self-Docking Floating Shipping Dock "Duke of Connaught." Distant view.
27 " " View looking from inside.
28 " " Near View.
29 Latest type of Dreadnought launched ready for service.
30 H.M.S. "Princess Royal."
31 H.M.S. "Triumph."
32 H.M.S. "Vanguard."
33 H.I.J.M.S. "Kongo" ready for action.
34 H.M.S. "Dominion." Built entirely at Barrow-in-Furness.
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36 H.M.S. "Phoenix" Torpedo Boat Destroyer at full speed.
37 Latest type of Submarine partly submerged.
38 A present day Submarine with crew on outer decks, and the Conning Tower.
39 Armed Aeroplane Gun protruding from head.
40 Ice breaker "Earl Grey."
41 Motor Boat "Ursula." 800 h.p. at full speed.
42 Light automatic rifle-calibre gun, firing 600 rounds per minute.
43 37 Millimetre Pom-pom Gun.
44 Britain's Naval and Aerial strength. A typical picture of the Fleet at anchor in the Dockyard.

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1 Quick Fire. 13 Pounder Gun, left rear.
2 " " " " " right rear.
3 " " 18 Pounder Gun, Mark 4, left rear.
4 " " " " " " right rear.
5 " " " " " " 5, rear. Open Breech.
6 " " " " " " right rear.
7 " " 3.7 in. Howitzer, rear. Open Breech.
8 " " " " right side.
9 " " 4.5 in. " left rear.
10 Quick Fire. 4.5 in. Howitzer, from right rear.
11 Breech Load. 60 Pounder Gun. Mark 4, from right front.
12 " " " " " " rear.
13 " " 6 in. 26 cwt. Howitzer, right front.
14 " " " " right rear.
15 " " 8 in. Howitzer. Mark VI, right front.
16 " " " " rear.
17 " " 9.2 in. Howitzer, from right front.
18 " " " " left rear.

For Slides on "Arms and Engines of Warfare in Early Times," see Section 6, "History."

AQX ROYAL VICTUALLING YARD, DEPTFORD.

Plain Slides, 2s. each.

1 The Entrance to the Yard.
2 The Officers' Houses. (The Terrace.)
3 The Pay Office.
4 The Main Pond, Flour Mill, Bakery and Naval Stores.
5 Figure-head of the San Joseph. (Nelson's old ship.)
6 The Wharf. Goods ready for shipment.
7 The Rum Store (No. 1 Vat, capacity 17,960 gallons).
8 The Canvas Store.
9 The Mess Traps, Games, etc.
10 The Soap and Candle Store.
11 Library Books.
12 Steam Biscuit Bakery.
13 Chocolate Mill.
14 Salt Meat Store.
15 Flour Store.
16 Packing Tobacco.
17 Bottling Lime Juice.
18 Clothing Store (Measuring and Folding Cloth Machine).
19 Women making Clothing.
20 Machines for testing the Strength of Cloth Canvas.
21 Sailors' and Officers' Badges.
22 Packing Room.
23 Group of Workmen.

ABF THE LONDON DOCKS.

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2 ,, ,, W.
3 The Entrance.
4 A Steamer just Arriving.
5 General View of a Waterway.
6 A Lock.
7 Vessel Waiting to go Through a Lock.
8 The North Basin, General View.
9 ,, ,,
10 ,, ,, from Top of a Warehouse.
11 ,, Steamer Sailing Out.
12 The South Basin, General View.
13 ,, Steamers.
14 General View of Steam Packets and Barge Laden with Hay.
15 Steam Packet "Loch Broom" Waiting to Unload.
16 The Deck of a Steam Packet.
17 Loading Barges off the Steam Packet.
18 Loading a Steam Packet with Rags.
19 The Bonded Warehouses.
20 View of the Sheds.
21 Interior of Wool Warehouse.
22 Loading Barge with Bales of Wool.
23 Unloading a Barge.
24 Loading Barges with Sacks of Corn.
25 Unloading Oranges.
26 Loading Barges with Barrels of Oranges.
27 ,, ,, ,,
28 Unloading Ice. ,, ,, ,,
29 Loading a Barge with Stones, showing Donkey Engine at Work.
30 Barge Laden with Kegs of Spirit.
31 Loading Barge with Kegs of Port Wine.
32 Unloading Kegs of Port Wine.
33 Kegs of Port Wine outside the Wine Vaults.
34 ,, ,, ,, ,,

BUI SUBMARINE TELEGRAPH CABLE MAKING, LAYING, REPAIRING AND WORKING.

By kind permission of The Eastern Telegraph Company, Messrs. NEWTON are glad to announce the publication of this interesting and instructive set of Slides, entitled, Submarine Telegraph Cable Making, Laying, Repairing and Working.

Coloured Slides, 6s. 6d. each. *Plain Slides, 2s. each.*

Typewritten Lecture, price 3s. 6d., or can be loaned with the Slides.

1 Title Slide.
2 Map showing Europe, Africa, and North and South America with Cable communications.
3 Map showing India, Australia, the Far East and Pacific Ocean with Cable communications.

SECTION I.—SUBMARINE TELEGRAPH CABLE MANUFACTURE.

4 Title Slide.
5 Cable stripped back to show the various layers of materials used.
6 Winding the copper wires together to form the central stranded conductor.
7 Machinery employed.
8 Examining and sorting raw gutta-percha in preparation for the process of mastication and covering the copper conductor.
9 Masticating the gutta-percha.
10 Masticated gutta-percha about to be passed through rolling machine.
11 Gutta-percha passing between rollers of machine.
12 Examining and coiling process.
13 Measuring the core.
14 A Reel of tested core about to be lowered into a tank of water.
15 Lowering tested core into a tank of water.
16 Apparatus used in such work.
17 A nearer view of some of the testing apparatus.
18 Process of covering the core with brass tape in operation.
19 Covering the core with tanned jute yarn.
20 The outer iron sheathing wires being wound on.
21 Specimens of finished cable.
22 Specimens of Cable.
23 More types of Cable.
24 Further Specimens of Cable.
25 Finished Cable being coiled into tanks for storage.

SUBMARINE TELEGRAPH CABLE MAKING—*Continued.*

SECTION II.—LAYING A SUBMARINE TELEGRAPH CABLE.

26 Title Slide.
27 The "Great Eastern," the first ship to successfully lay a long distance Cable.
28 A modern Cable laying Ship, C.S. "Colonia."
29 A typical Cable repairing Ship the C.S. "John Pender."
30 The Eastern Telegraph Company's Flag.
31 A view of part of a Cable Ship's deck.
32 Another view of a Cable Ship's deck.
33 Loading Cable.
34 The hauled Cable reaching the ship.
35 On deck.
36 Down below.
37 Testing room on ship.
38 Digging the trench.
39 Taking Cable ashore.
40 Cable in trench preparatory to filling in.
41 Paying out Cable.
42 Floating in the shore end.
43 Hauling in the shore end, a team of oxen being used.
44 Another stage of the proceedings.
45 One of the oxen and its driver.
46 Slipping the final splice.

SECTION III.—REPAIRING A CABLE.

47 Title Slide.
48 Finding the position of the Ship.
49 Another picture of this operation.
50 A sounding machine.
51 Taking a sounding.
52 A Cable buoy slung upside down.
53 A Mushroom being lowered.
54 Mark buoy being lowered away.
55 Lamps and frames being attached to mark buoy.
56 Boat at mark buoy seen over bow sheaves.
57 Mark buoy lit up and in position.
58 Rennie Grapnel.
59 A Lucas Grapnel with jaws extended.
60 A Lucas Grapnel with jaws closed bringing up one end of cable.
61 A sliding prong grapnel.
62 The Cable on the bed of the ocean which is now to be grappled for.
63 Sliding prong grapnel in position at bows for lowering.
64 Another view of this operation.
65 A further stage of the proceedings.
66 Grapnel going down.
67 Paying out grappling rope.
68 Grapnel at bottom.
69 The Dynamometer.
70 A picture of the ocean bed showing cable just hooked.
71 Officer of the watch signalling that cable has been hooked.
72 Captain at telegraph getting ship in position for lifting the cable.
73 Hauling in.
74 The powerful deck machinery which does the hauling.
75 Another view of deck machinery.
76 First appearance of cable above surface of the water.
77 Making fast the Cable.
78 Cutting the Cable.
79 A close up view of a cable–hand sawing the cable through.
80 One of the ends being hauled on board for testing after the sawing through is accomplished.
81 Buoy riding on sea end.
82 Picking up the Cable.
83 The faulty Cable found.
84 Cutting out the faulty length.
85 Broken Cable.
86 A Jointer at work jointing the core.
87 Another view of a jointer at work.
88 Splicing up the outer sheathing wires after the inner core has been jointed.
89 Men handling sufficient slack of cable to enable the jointing to be carried out.
90 Paying out new Cable.
91 A near view of the bow sheaves showing cable passing out.
92 Arrival at buoyed sea end.
93 Unrigging buoy.
94 Bringing buoy back to ship.
95 Buoy about to be lifted.
96 Buoy alongside for lifting.
97 Hauling aboard the sea end.
98 Dropping the repaired cable.
99 Mark buoy has now to be picked up and boats hoisted in.
100 Job finished. Ship returns to port.
101 Examining Cable.
102 Another view of an under-running sheave, stoppers are being attached as the cable is to be cut and hauled in.
103 Cable being coiled into a lighter from the ship for shallow water repair.
104 Lighter away in tow of tug.
105 At work with lighter.
106 A nearer view of the operations.
107 Another picture showing cable passing out.
108 Shore Staff making a repair with a ship's boat.

SECTION IV.—HOW CABLEGRAMS ARE SENT AND RECEIVED.

109 Title Slide.
110 Telegraphs being handed in for despatch at the Eastern Telegraph Company's main office in London.
111 Pneumatic tubes at the Main Station by which these messages are received.
112 The pumping machinery which compresses the air used in the pneumatic tubes.
113 Sorting Rack.
114 Instrument Room showing operators at work.
115 A Message for abroad being punched ready for transmission.
116 The punching instrument.
117 Automatic Transmitter.
118 Cable-receiving perforator.
119 Automatic Printing Apparatus.
120 Operator cutting printed slip into suitable lengths.
121 Finished message.
122 Copying the message.
123 Addressing envelopes with addressing machine prior to delivery.
124 Delivering the message.
125 Eastern Telegraph Company's received form.

For Slides on "Wireless Telegraphy" see "Science," Section 2, of this Catalogue.

CU THE STEAM ENGINE, MOTORS, ETC.

Their evolution and application to Locomotion on Land and Sea.

Plain Slides, 2s. each.

1 Hero's Engine, 120 B.C.
2 Branca's Engine, A.D. 1629.
3 Sir Isaac Newton's (suggested) Steam Locomotive, A.D. 1680.
4 Savery's Steam Engine, at work pumping, A.D. 1698.
5 Papin's Engine (force-pump with safety valves), A.D. 1707.
6 Newcomen's Atmospheric Engine, at work, pumping a mine.
7 Newcomen's Atmospheric Engine (diagram).
8 Newcomen's Atmospheric Engine, Model in Glasgow University, repaired by James Watt.
9 James Watt's first experiment.
10 James Watt inventing the Steam Engine.
11 Watt's Engine with Sun and Planet gear (photographed direct from one of the last engines made by Watt).
12 Watt's Single-acting Engine (sectional diagram), A.D. 1775.
13 W. Symington's Model Coach, A.D. 1786.
14 Miller & Symington's Steam Launch, at Dalswinton, A.D. 1788.
15 Miller & Symington's Steam Launch, the Engines.
16 Watt's Double-acting Engine (diagram), A.D. 1789.
17 Watt's "Waggon" Boiler (longitudinal section).
18 Watt's (Adaptation) Centrifugal Governor and Throttle Valve.
19 Portrait of James Watt.
20 Symington's Steamer "Charlotte Dundas" on Forth and Clyde Canal, A.D. 1803.
21 Symington's Steamer "Charlotte Dundas" (section showing machinery).
22 Portrait of Matthew Boulton, F.R.S., of Boulton and Watt, Soho.
23 Portrait of Richard Trevithick.
24 Trevithick's Tramway Engine, 1803.
25 " (the earliest) High Pressure Steam Road Locomotive, 1801.
26 " Model.
27 " Engine.
28 Murdoch's Model Engine.
29 Fulton's Steamer "North River" or "Clermont," on the Hudson, 1807.
30 Fulton's Steamer "North River" or "Clermont," the Machinery.
31 "The Blenkinsop" (rack rail locomotive), Middleton Colliery, 1812.
32 Bell's Steamer "Comet" on the Clyde, 1812.
33 " " " two views of the machinery by Watt.

RAILWAY LOCOMOTIVES.

34 Stephenson's "Rocket," 1829.
35 Portrait of George Stephenson.
36 The "John Stevens," 1825.
37 The First Locomotive passing Great Grimsby Church, on the Manchester, Sheffield, and Lincolnshire Railway.
38 The "Planet," 1830, Liverpool and Manchester Railway.
39 "Puffing Billy."
40 The "De Witt Clinton," 1831, New York Central Railway (and stage-coach train).
41 The "John Bull" and stage-coach train, 1833, Mohawk and Hudson Railway.
42 The "George Washington, 1835.
43 Stephenson's, "most recent" (1840) Locomotive (longitudinal section).
44 Stephenson's "most recent" (1840) Locomotive Plan of working parts under boiler.
45 " Locomotive of about 1850 (one of fifty sent to Italy).
46 Giffard's Injector, section showing construction.
47 "The Lord of the Isles," 1851, G.W.R. (broad gauge).
48 Midland Railway Engine, 1896.
49 " " Train, 1896.
50 Train leaving Euston Station.
51 L.N.W. Railway Express Train.
52 M.R. Train entering St. Pancras Station.
53 The new 4-Cylinder Engine, on a Permanent Way Improved for Safety (Germany).
54 L. & N.W.R. Compound Express Passenger Locomotive "Queen Empress."
55 M.R., 1901, Express Passenger Locomotive.
56 10-Wheel Freight Locomotive, American type.
57 4-Wheel Tank Locomotive, American type.
58 12-Wheeled American Heavy Freight Locomotive.
59 8-Wheeled American Express Passenger Loco.
60 Compound "American" type Locomotive, by the Baldwin Company.
61 Central London Railway, Section of "Tube," showing how constructed.
62 Central London Railway. Cross-section of "Tube" with train "in situ."
63 Central London Railway. Platform with train waiting.
64 Central London Railway. Platform with Passengers leaving the train.
65 Central London Railway. Railway carriage with motor cab.
66 Central London Railway. Railway carriage with relay motor cab.

See also Nos. 115 to 126 of this Set.

ROAD LOCOMOTIVES.

See also the early Nos. of this set, 3, 13, etc.
67 Cugnot's Steam Car, 1770.
68 Cartwright's Engine (for alcohol vapour of steam), 1797.
69 Burstall & Hill's Steam Coach (3-4 miles per hour), 1824.
70 James's Steam Coach (12-15 miles per hour), 1829.
71 Church's Patent, 1st July, 1832. London and Birmingham Steam Carriage Co.
72 William Church's Steam Carriage, 1832.
73 Steam Carriage. The First Motor Omnibus in London. 1833.
74 Hancock's Steam Coach. The "Era" Arriving at Greenwich. 1833.
75 Hancock's Steam Omnibus, which ran on the common Roads.
76 Mr. Galsworthy Gurney's Steam Carriage, 1833.
77 The Squire and Macerone Steam Coach on the Harrow Road, 1833.
78 The Touring Car in 1860. Rickett's Steam Carriage for common Roads.
79 Carret's Steam Carriage, 1862 (15 miles an hour).
80 The "Advance," 1870, road Steamer with rubber tyres.
81 Parcel-Service Road Locomotive, 1886 (8 miles an hour).
82 Modern Road Locomotive, for haulage, 1890.
83 The Progress of the Wheel. The Ousting of the Horse from London Thoroughfares.
84 Serpollett's Motor Car.

THE STEAM ENGINE, MOTORS, ETC.—*Continued.*

85 Roots and Venables' Oil Motor, kerosene, not spirit or benzoline.
86 Propeller Steam Vehicles, four-wheeled Wagonette, Luggage and three-wheeled Victoria.
87 Steam Motor Car, 4½ horse-power. Front view showing Condenser.
88 Steam Motor Car, 4½ horse-power. Side view showing steering, water tank, &c.
89 Steam Motor Car, 4½ horse power. Corner view showing works.
90 The Albone 1vel Agricultural Motor.
91 The Albone 1vel Agricultural Motor hauling a mowing machine.
92 The Albone 1vel Agricultural Motor working a reaper and binder.
93 The Albone 1vel Agricultural Motor drawing a double furrow plough.
94 Lord Roberts on a Motor Car at Aldershot.
95 Mr. Cecil Edge (cousin of Mr. S. D. Edge) on a sixteen horse-power Napier Motor Car.
96 A 10 horse-power Panhard Motor Car.
97 A Motor Car on the Road (4-seater).
98 Gordon-Bennet Race, 1904. The Finish.
99 A Taxi Cab.
100 A Motor Omnibus.
101 An Express Carrier.
102 Motor Cycle with Side Car.
103 The King's Coach in the 20th Century.
104 Motor arriving at Meet of the Hounds.

MARINE ENGINES, ETC.

105 The "Enterprise," 1825 (first steamer to India, via Cape, 113 days), paddles 16 ft. diam.
106 The "United Kingdom," 1826 ("the wonder of the day"), 160 ft. long, engines 200 h.p.
107 The "Robert S. Stockton," with Ericsson's screw propeller, crossing the Atlantic, 1839.
108 Section showing Ericsson's Screw Propeller in the "Robert S. Stockton."
109 "Iona." Elevations and plan of oscillating cylinder, paddle, steam engine.
110 "Arabia." Elevation of verticle cylinder, paddle, steam engine.
111 Oscillating Cylinders of the paddles of the "Great Eastern."
112 "Barwon." Sections and plan of marine screw, horizontal engine.
113 "Jura." Elevation and plan of vertical engine with beam and gear.
114 Twin-screw Triple-expansion Engines of H.M.S. "Edgar." See also Set B V D below.
115 Hetton Colliery Locomotive built by George Stephenson and Nicholas Wood. 1822.
116 "Locomotive No. 1" Stockton and Darlington Railway, built by Stephenson in 1825.
117 Killingworth Colliery Locomotive "Billy," built by Stephenson in 1830.
118 Loco "Derwent," No. 25. Stockton and Darlington Railway, built by A. Kitching, Darlington, in 1845. Timothy Hackworth's design.
119 Loco No. 853. North Eastern Railway, built by Beyer Peacock & Co., Manchester, to the design of Edward Fletcher in 1873.
120 Loco No. 1478. North Eastern Railway, built at the Gateshead Works, 1885, to designs approved of by Locomotive Committee; class known as "Tennant Express."
121 Engine No. 1870. North Eastern Railway, built at the Gateshead Works, 1896. These engines have the largest coupled wheels in the world. 7-7½ diameter.
122 Engine No. 1238. North Eastern Railway, built at Darlington Works in 1908.
123 Engine No. 2163. North Eastern Railway, 3-cylinder "Atlantic Type," built at Darlington Works, 1914.
124 Engine No. 901. North Eastern Railway. 3-cylinder Mineral Engine, built at Darlington Works, 1919.
125 Engine No. 846. North Eastern Railway, 3-cylinder fast goods built at Darlington Works, 1920.
126 Engine No. 2402. London & North Eastern Railway, 3-cylinder "Pacific Type," built at Darlington Works, 1924.

NOTE.—For completing this set we can undertake to make Slides of Engineers' Drawings, as by our many processes we can always ensure perfect results.

See also "Motor Car Construction," etc., page 807, and "The Motor Car Industry," page 844.

See also B V D below. For Slides on "Heat," see Science, Section 2 of this Catalogue.

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4 Single Cylinder Engine Direct Coupled to Dynamo
5 Petter S Type Horizontal Engine. 18/14. B.H.P.
6 16 20 B.H.P. Twin Cylinder Marine Engine.
7 Portable S Type Engine.
8 Twin Cylinder Engine Direct Coupled to Dynamo.
9 36/40 Twin Cylinder Engine Direct Coupled to Alternator and Dynamo.
10 8/10 B.H.P. S Type Marine Engine.
11 18/21 B.H.P. Single Cylinder Engine.
12 5/8 B.H.P. Single Cylinder S Type Engine.
13 Petter Pump Set with 1½ B.H.P. M. Type Engine.
14 Petter Handyman Engine.
15 24/28 and 36/42 B.H.P. S Type Twin Cylinder Petter Engine for working on crude fuel oil or paraffin.
16 5/8 B.H.P. M. Type Petter Engine for working on Petrol or Paraffin.
17 The Machine Shop. General View.
18 The Machine Shop. General View.
19 The Core Shop.
20 Core Making.
21 Casting.
22 Tapping the furnace at the foundry.
23 A tool maker at work.
24 Assembling a Petter Engine.
25 Assembling a Petter Engine.
26 Testing a Petter 12/14 B.H.P. Portable Engine

Typewritten Lecture Notes, 2s., or can be loaned with the Slides.

AZK

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1 Steam Navvy. Scoop being lowered for gathering earth.
2 ,, ,, Scooping up earth.
3 ,, ,, Showing face of earth after scooping.
4 ,, ,, Scoop full hoisted ready for Truck.
5 ,, ,, Tipping earth into waggon.
6 ,, ,, Latest Pattern at work.
7 ,, ,, Smaller Navvy assisting latest American type.
8 ,, ,, at work with Contractor's truck; also carts taking away clearings.
9 ,, ,, Making Railway bed. Levelling ground.
10 Track Making. Making a cutting in soft earth.
11 ,, ,, Laying out track to pass under rival Company's Line.
12 ,, ,, Railway cutting finished.
13 ,, ,, Contractor's train and gang unloading bed substance.
14 ,, ,, Levelling the track and making stone beds.
15 ,, ,, Preparing the bed for the Sleepers.
16 ,, ,, Laying the track. Placing sleepers on the bed.
17 ,, ,, Track partly laid.
18 ,, ,, Forcing Rail into the Chairs before blocking.
19 ,, ,, Lifting and Packing permanent track.
20 ,, ,, Relaying the Track.
21 Tunnel Making. Drilling through Rock.
22 ,, ,, Brick built tunnel showing supports.
23 ,, ,, Tunnel showing detail of timber structure top.
24 ,, ,, Tunnel.
25 ,, ,, View of Shaft of tunnel outside.
26 ,, ,, Timber-work at tunnel entrance.
27 ,, ,, Entrance and winged wall from below.
28 ,, ,, Entrance to Tunnel. Brick fan and drainage banks.
29 ,, ,, Old Twin brick tunnel on Electrified D.R.
30 ,, ,, Entrance to Tripple Tunnel. Linslade.
31 ,, ,, A Tunnel Entrance. Stone faced, decorative.
32 Severn Tunnel. English side.
33 ,, ,, A tunnel and Cutting alongside.
34 Railway Cutting. A steep cutting showing entrance to tunnel.
35 ,, ,, Cutting made by blasting rock.
36 ,, ,, An Express in Cutting through Chalk Cliffs between Dover and Folkestone, S.E. & C.R.
37 Viaducts. Concrete Mixer at work.
38 ,, Timber for the Piers.
39 ,, One arch and pier in construction.
40 ,, Construction of arches top view along.
41 ,, Five arches in the making from below.
42 ,, Sectional drawing.
43 ,, Eleven arches of 30 ft. span.
44 ,, Stone Viaduct, 176 yards long, 12 spans of 50 ft.
45 ,, Steel Viaduct at Ilkeston.
46 ,, Bridge and Viaduct curved and small arches over low river.
47 ,, Old and New—Pontycycitle—Viaduct on a stone road bridge.
48 Bridge Building. Timbering for Structure.
49 ,, ,, Rivetting Plant and men at work.
50 ,, ,, Uprights for side girders in position.
51 ,, ,, Side girders in position.
52 ,, ,, Looking across when approaching completion.
53 ,, ,, Steel side girder hoisted in position by Derrick.
54 ,, ,, Steel span ready for placing in position.
55 ,, ,, The span in position ready to be lowered on Piers.
56 ,, ,, Cranes lowering Girder into position.
57 ,, ,, Bridge building from both sides, showing two travellers.
58 ,, ,, A strong brick slant and banks open.
59 ,, ,, New bridge being made alongside of old bridge.
60 ,, ,, Bridge over Canal showing bow stringed girders and new plate girder being erected.
61 ,, ,, Single span steel Viaduct over a Canal on slant.
62 ,, ,, Double steel span over roadway and forded roads.
63 ,, ,, Bridge showing overhead struts attached to top flange of main girders for strength.
64 ,, ,, Steel bridge across road, showing curved girders added for strength.
65 ,, ,, Brick arches and steel span over Canal.
66 ,, ,, Stone piers and bridge at Runcorn.
67 ,, ,, Britannia Tubular Bridge, N.Wales.
68 ,, ,, A transporter bridge over Tidal River.
69 ,, ,, A swing Bridge (steel) open.
70 ,, ,, Menai Suspension bridge. Stone and steel span.
71 ,, ,, A steel Cantilever Bridge with centre opening for river traffic.
72 ,, ,, A steel Cantilever Bridge looking along, showing girder work.
73 View of Main Line and branch lines at Junction M.R.
74 Main Line from London to North, showing Signals, points and cross-overs built at side of Watling Street.
75 Electric Controlled points.
76 Approach to London Bridge Station, showing points, crossovers and signalling.
77 Railway Track. A single crossover.
78 Signalling. Electrical controlled points.
79 Main Line over Suburban line at Streatham.
80 A Town Railway Cutting, showing track going under Main Line.
81 Railway Tracks, showing troughs for picking up water.
82 Exterior of Signal Box at a Junction, M.R.
83 Interior of Signal Box, showing men operating levers, M.R.
84 Signalling. Interior of New Cabin showing electric and pneumatic signal levers.
85 New method by light letters and arms.
86 Electric Home and Distant Signal. New system.

THE GREAT RAILWAYS—(*continued*)

87 Electric controlled light signal, near view.
88 Electric controlled light signals on C.L.R.
89 Entrance to a large station, Manchester.
90 Junctions. Near view showing six platforms.
91 ,, Inside a terminus.
92 ,, Inside a Terminus, showing crossover in platform bays.
93 Termini. Paddington.
94 ,, St Pancras.
95 ,, King's Cross. L.N.E.R.
96 ,, Euston.
97 ,, Victoria.
98 ,, Charing Cross.
99 A Wood built Station on the Electrified London District Railway.
100 Main Line showing Goods Sidings, also Sidings off main shunt.
101 General view of London Goods Yard.
102 Turn-tables in a goods yard.
103 Engines. A French 4-6-2 Pacific Engine and Train.
104 ,, Belgian State Local Engine.
105 ,, Dignity and Impudence. Two L.B. & S.C.R. Engines. An Express and a local for comparison.
106 ,, 4-4-1. Passenger Engine. Long Distance, W.R.
107 ,, 4-6-0 Four Cylinder. Star Class Engine, "Queen Boadicea," G.W.R.
108 ,, Four wheeled coupled Bogie Express Passenger Engine. G.E.R.
109 ,, Six wheeled coupled Bogie Express Passenger Engine. G.E.R.
110 ,, Compound Bogie Passenger Engine. M.R.
111 ,, Four wheeled coupled 2-4-2 Surburban Passenger Tank Engine. L.N.E.R.
112 Engines. Latest type of long distance Express Engine.
113 ,, Express, Flying Scotchman, leaving King's Cross.
114 ,, Four wheeled coupled Goods Yard shunting Engine. G.E.R.
115 ,, Pennsylvania, U.S.A. Heaviest in world.
116 ,, Erie (U.S.A.) Engine 2-8-8-8-2. One of the largest in the world.
117 ,, U.S.A. Northern Pacific Railway train, showing type of Engine.
118 ,, 30 ton Pulley Waggon.
119 ,, Six wheeled coupled Goods and Mineral Engine. G.W.R.
120 ,, Latest type of Goods Engine. Eight wheeled. L.M.S.
121 ,, Six wheeled coupled Suburban Passenger Tank Locomotive. L.N.E.R.
122 ,, Six wheeled coupled Surburban Passenger Tank Engine. L.N.E.R.
123 ,, Local Passenger Engine. L. & N.W.R.
124 Snow Plough and Engine as used on G.W.R.
125 A snow block in Scotland cutting. Relief gang at work.
126 10 Ton open Goods Waggon.
127 Cattle Truck, also used for fish.
128 25 Ton covered Goods Waggon.
129 30 Ton, 36 feet well for Gondola Waggon.
130 Carriages. Interior of 1st Class Buffet car.
131 ,, Interior of 1st Class Dining Car.
132 ,, Interior of a Sleeping Car.
133 ,, Interior of an Observation Car. On a Welsh Mountain Railway.
134 ,, Hospital Train. Interior showing three wards.

THE HISTORY OF THE RAILWAYS AND THE CENTENARY CELEBRATIONS OF 1925—*continued.*

42 First passenger engine that ran in Scotland, built in 1833.
43 The "John Bull" and stage-coach train, 1832. Mohawk and Hudson Railway.
44 The "George Washington," 1835.
45 First-class and second-class train on the Liverpool and Manchester Railway in 1833.
46 Liverpool and Manchester Railway Time-table issued in 1830.
47 A view of Darlington as seen from the Yarm Road in 1835.
48 Old erecting shops.
49 Old Drilling Machine.
50 "Fish-bellied" rails as used 1815-1848.
51 Earliest rails borne on chairs and blocks of stone.
52 Old Rails on stone blocks at Brusselton Incline, Nr. Shelton.
53 Early forms of Rails.
54 Old Steel Chairs.
55 Rails carried on cast-iron chairs.
56 The first Stockton and Darlington Railway Signal Lamp.
57 Old Lamps used in the early days of the Railways.
58 A Brake Winder.
59 Early forms of Brakes.
60 Early type of platform Buffer.
61 Models of early kinds of signals.
62 Some of the early insulators.
63 The earliest communication cord which revolved the wheel and rung the bell.
64 The "Red Deer," a locomotive of 1840.
65 One of the first passenger carriages on the Stockton and Darlington Railway.
66 Interior of a first-class in 1840.
67 Interior of a third-class with early seating arrangement.
68 Railway coaches of the 40's.
69 A Chauldron Wagon.
70 "The Lord of the Isles," 1851. G.W.R. (broad gauge).
71 Wheels of a Locomotive.

PRESENT DAY.

72 Interior of the largest signal box, with 259 levers.
73 Signal levers and time recorders.
74 Using a Megaphone at York Station.
75 3rd Class Pullman Car.
76 A twin sleeping car on the London & North Eastern Railway.
77 Travelling Post Office.
78 A Mail Van, showing net and cage.
79 A 40-ton Mineral Wagon.
80 Huge trolley wagon on the London and North Eastern Railway.
81 A Petrol electric car.
82 An electric train on the Newcastle coast line.
83 The Alexandra Bridge at Sunderland.
84 The High Level Bridge at Newcastle.
85 The Border Bridge over the Tweed at Berwick.
86 Bedlington Viaduct.
87 Newcastle Bridge.
88 Yarm Viaduct.
89 The Gaunless Bridge, Darlington.
90 The Stockton and Darlington Railway crossing and signal box outside Darlington Bank Top station.
91 Bank Top Station, Darlington, on the London and North Eastern Railway.
92 The largest crossing in Britain, just outside Newcastle Station.

CENTENARY CELEBRATIONS.

93 Stockton and Darlington Railway, Engine No. 1, preceded by Flag-man.
94 Stockton and Darlington Railway, Engine No. 1, and passenger coaches.
95 Engine "Bretton Colliery."
96 Types of early Rolling stock, Stockton and Darlington Railway.
97 The Engine "Derwent."
98 The Engine "Derwent" being stoked on the journey.
99 The Engine "Invicta."
100 Passenger coach of the 40's.
101 3rd class Coach of the 40's.
102 1870 Engine.
103 1880 type of Engine and train.
104 Pacific type of Engine and train, showing stream line.
105 Pacific type of goods Engine.
106 Petrol Electric Motor Coach.
107 Duke and Duchess of York in Railway Museum.
108 Unveiling the George Stephenson Memorial.
109 Ancient and Modern Locomotion—No. 1, the forerunner of the world's railways, compared with London and North Eastern Railway's Pacific Loco "City of York," 1925.

For further selection of Slides dealing with the History and early types of Locomotion see series C U, page 817, and for a recent set on the Making of a Railway and latest Rolling Stock, see series A Z K, page 819.

B X T SUNBEAM BICYCLES AND MOTOR CYCLES.

Messrs. Newton are indebted to the Imperial Chemical Industries, Ltd., for permission to publish this interesting series of Slides depicting the manufacture of the Sunbeam Bicycle and Motor Cycles at the Sunbeam Works, Wolverhampton.

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4 Grinding gear box main shaft.
5 Profiling connecting rods.
6 Drilling Sunbeam hubs.
7 Drilling front forks in "jigs."
8 "Viewing" engine shafts.
9 Early stage in making Sunbeam tanks.
10 Later stage in making Sunbeam tanks.
11 Sunbeam tank—finished product.
12 Making the Sunbeam oil bath rear chaincase.
13 Final process in making the Sunbeam oil bath rear chaincase.
14 Sunbeam oil bath rear chaincase.
15 Sunbeam oil bath front chaincase.
16 Primary drive, showing clutch, enclosed kick-starter and shock absorber on engine.
17 First stage in making bicycle oil bath chaincase. Fitting the deadening felts.
18 Later state in making bicycle chaincase. Joining the two halves.
19 The parts of the Sunbeam patent two-speed gear.
20 A view in the bicycle erecting shop.
21 The finished article. A Golden Sunbeam, two
23 Sunbeam divided rear axle, showing gap for changing tyre.
24 Sunbeam detachable rear wheel.
25 Shot-blast Plant.
26 A view in the enamelling shops.
27 Sunbeam Model 90 two-port O.H.V. Engine with patent valve springs.
28 Detachable head of the Sunbeam Model 90 engine, showing the patent "double hairpin" valve springs, etc.
29 The mechanism of the Sunbeam internal expanding brakes.
30 Sunbeam leaf spring front fork.
31 Sunbeam adjustable steering damper.
32 The comprehensive Sunbeam tool kit.
33 The finished product—a typical Sunbeam roadster motor cycle.
34 A batch of machines packed ready for despatch.
35 A group of workmen and staff at the dinner hour.
36 The football team of the Sunbeamland works sports club.
37 Finished product—a typical Sunbeam touring motor cycle and sidecar.
38 Finished product—a typical racing Sunbeam

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10 Market Boats, Malay Settlement.
11 Canton. Chinese Sampan or Passenger Boat.
12 Chinese Ice punts on the frozen canal.
13 Rowing boats with leg.
14 Timber raft.
15 A laden barge on a Canal.
16 A Neglected Canal.
17 Rope Bridge at Carrick-a-Rede.
18 Sleighing. A typical Horse-sleigh in Holland.
19 Packhorse Convoy.
20 Old Stage Waggon.
21 Stage Coach.
22 A Diligence.
23 An English citizen riding with his wife.
24 Group and Sedan Chair, about 1720.
25 Bullock Carts in the Tropics.
26 Donkey-cart, Saumur.
27 A Burmese or Indian Panelled closed Cart.
28 An Ekka of India.
29 Lady Travelling in Sedan Chair.
30 Lady travelling in Hand Carriage.
31 Rickshaw, S. Africa.
32 Camel Team and waggon, Australia.
33 An Ox Waggon in S. Africa.
34 A Dog Sledge in the Snow.
35 Russian Sledge on Poles.
36 A Chinese litter carried on poles between Ponies.
37 A Hammock Journey.
38 Chinese Wheelbarrow, two female passengers.
39 Chinese walking on stilts over muddy marshes.
40 Milk cart drawn by dogs.
41 Steam Carriages. The First Motor Omnibus in London, 1833.
42 Locomotive No 1. Stockton & Darlington Railway, built by Stephenson in 1825.
43 Stephenson's Rocket, 1829.
44 The First Railway Carriage.
45 Travelling on the Liverpool & Manchester Railway in 1831. Goods Train.
46 " " " Passenger Train.
47 Trams drawn by mules at the Elephant and Castle.
48 Bicycles from 1820 to 1905.
49 The Century of Invention, A.D. 2000, or the progress of Aero-station, steam, rail-roads, movable houses and perpetual motion.
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56 An Aeroplane. 2 engines of 730 H.P. Rolls.
57 Zeppelin Airship in flight.
58 Airship R.34 in flight.
59 A Hydroplane. (Naval.)
60 A Submarine. (Naval.)

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14 Hancock's Steam Coach arriving at Greenwich, 1833.
15 Parcel Road Locomotion, 1886.
16 Four Wheeled Cab.
17 An Omnibus, Knife-board type.
18 A Hansom Cab.
19 A Horse Omnibus.
20 Trams drawn by mules.
21 Steam train on the Metropolitan Railway.
22 Cable Tram Cars.
23 A Traffic jam in the days of Horse-buses.
24 Fleet Street and traffic.
25 Early type of Motor Bus.
26 Early type of electric Tram.
27 A London Termini in 1890.
28 Three Generations. Four Wheeler, Hansom Cab, Taxi-cab.
29 An Early Motor Car. Serpollet Four Seater.
30 An Early Steam Car.
31 A Motor Ambulance.
32 A Luxurious Motor Car. A Rolls Royce.
33 A Motor Car for the Masses. A Morris Cowley.
34 Piccadilly Circus. Present day.
35 London Bridge. Present day.
36 Electric Trams crossing Westminster Bridge.

LONDON UNDERGROUND RAILWAYS

37 Map of London, present day, showing Tube Railways, Bus and Tram Routes.
38 Section of the Tunnel, C.L.R.
39 Charing Cross Station. Section. (Drawing.)
40 Camden Town, showing cross-overs. (Drawing.)
41 Lifts at Covent Garden Station. Below.
42 A Liftman. Night study.
43 Booking Hall, Charing Cross Station.
44 " Rolltic " Ticket Machine.
45 Passimeters, Oxford Circus Station.
46 Moving Stairway.
47 Comb type Escalator, Clapham Common Station.
48 Clapham South Station. Suburban Station.
49 Edgware Station. Suburban Station.
50 Football crowd at Walham Green Station.
51 Early type of train, C.L.R.
52 Three Car Train.
53 Six Car Train.
54 Train, Hampstead & City Line.
55 Dead Man's Handle.
56 Signal Cabin, Interior, Camden Town.
57 Interior of Car, Bakerloo Rolling Stock.
58 Interior of Car, Piccadilly Rolling Stock.
59 Interior of Car, Hampstead Rolling Stock.
60 Interior of Car on City & South London Railway.

LONDON GENERAL OMNIBUS CO.

61 Motor Buses.
62 S. Type Motor Omnibus.
63 S. Type Motor Omnibus. Interior.
64 Single Deck Bus.
65 N.S. Single Deck Bus, with pneumatic tyres.
66 N.S. Type Motor Bus, 3/4 front, nearside view.
67 N.S. Covered Top Bus, nearside 3/4 view.
68 Victoria Station Courtyard.
69 Bus Station at British Empire Exhibition, Wembley, 1924-5.
70 London Traffic Guide. Policeman on Point duty.

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9 Rustic Bridge and Causeway at Thirlemere.
10 Curious Wooden Bridge in the Engadine.
11 Covered Foot Bridge at Lucerne.
12 Covered Road Bridge at Schwyz.
13 Curious Japanese Bridge.

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14 Gothic Triangular Bridge at Croyland.
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16 Devil's Bridge, St. Gothard Pass.
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18 Monnow Bridge, with Gate House.
19 Vecchio Bridge, Florence.
20 The Rialto Bridge, Venice.
21 A Venetian Bridge, with steps.
22 Brick Railway Bridge at Taplow.

VIADUCTS.

23 Roman Aqueduct in Spain.
24 Royal Border Bridge, Berwick-on-Tweed.
25 The Balcombe Railway Viaduct.
26 Threstle Viaduct in Cornwall.

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27 Bridge of Boats in India.
28 Coblentz Bridge of Boats.
29 Steam Floating Bridge, Southampton.
30 Flying Bridge at Basle.
31 Rope Bridge, Carrick a Rede.
32 Rope Bridge, Carrick a Rede, end view.
33 Suspension Bridge at Fribourg.
34 Clifton Suspension Bridge.

BRIDGES CONSTRUCTED OF IRON.

35 Bridges over the Maas, Rotterdam.
36 Royal Albert Bridge, Saltash.
37 The Britannia Tubular Bridge.
38 The Crumlin Viaduct.
39 Lattice Girder Bridge, near Fribourg.
40 The Tay Bridge, Scotland.
41 The Forth Bridge, Scotland.
42 High Level Bridge, Manchester Ship Canal.
43 Bridge, Lock and Weir, Richmond.
44 A Lift-up Bridge at Alpnach.
45 Railway Swing Bridge at Folkestone.
46 Swing Bridge, Newcastle-on-Tyne.
47 Swing Aqueduct, Barton, near Manchester.
48 The Tower Bridge, with bascules raised.
49 The Tower Bridge, with bascules closing.
50 The Tower Bridge, London.

See also "The Building of Saltash Bridge," page 809 of this Section of the Catalogue.

For other Bridges of various materials, see A Z K, page 819, and the Geographical Section, 5, of this Catalogue, under the headings of the different countries in which they are situated.

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3 The Building of Eastham Lock.
4 Lock Gates under Construction.
5 A Lock completed but empty.
6 Consolidation of banks by fascines.
7 Excavating in No. 9 Dock.
8 No. 9 Dock partially filled with water.
9 Dynamiting No. 9 Dock.
10 Navvies at work on wall, No. 9 Dock.
11 Showing transit sheds.
12 Sluice Gates on Canal.
13 Sluice Gates on Canal. Close up.
14 Lock Gates. Closed.
15 Barton Aqueduct and Trafford Road from the air.
16 Barton Swing Aqueduct.
17 Barton Swing Aqueduct. Interior.
18 Vessel approaching Eastham Lock.
19 Large Steamer navigating the Canal.
20 S.S. "Argyllshire" navigating the Canal.
21 S.S. "Argyllshire" entering mode wheel Lock.
22 Bird's-eye view of the Manchester Docks.
23 View of No. 8 Dock.
24 View of No. 9 Dock.
25 View of No. 9 Dock. Aerial view.
26 Railway swing bridge over Canal.
27 View of Transit Sheds and Railway Sidings at Manchester Docks.
28 View of Quay Side.
29 Vessel discharging direct to Railway Wagons and Transit Sheds.
30 Steamers discharging grain overside to barges.
31 Steamers discharging grain overside to barges.
32 Discharging Grain in bulk by means of "Legs."
33 Discharging Flour from North America direct to Railway Wagons.
34 Discharging Egyptian Cotton.
35 Delivering Cotton from one of M.S.C. Coy's. Warehouses to Railway Wagon.
36 Discharging Ore by Grab Cranes at Irwell Park Wharf.
37 Discharging general cargo from New York.
38 Steamer discharging paper to Railway Wagons, Carts and Transit Sheds.

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8 Making for Fishing Ground
9 Passing a Stranger at Sea
10 In a stiffening Breeze
11 Fixing Lamp on Buoy before shortening Net
12 Preparing to shoot Net overboard
13 Hauling up the Trawl
14 First View of Catch
15 Pulling up slack part of Net
16 Landing of Net
17 Preparing to empty the Net
18 Preparing to shoot Net again
19 Final Emptying of Net
20 Splendid Haul on deck
21 Curious Catch
22 A Captured Enemy, the Shark
23 Supplying Fish with Sea-water
24 Sorting the Fish
25 Gutting the Fish
26 Cleaning Fish before packing
27 Lowering Fish into Hold
28 Tanking Fish for extracting the Oil
29 Pressing the oil from the livers
30 Hauling fish ashore
31 Fish on the Quay
32 The Fish Pontoon, Grimsby
33 Herring Fleet. Leaving Harbour
34 ,, Boat hoisting Sail
35 ,, ,, in tow
36 ,, Fleet at Quay-side
37 Unloading Drifter
38 Harbour in the Herring time
39 Girls gutting and packing herrings
40 A Trawler towing a disabled friend into Harbour
41 Sterner duty. Lifeboat putting off to the Wreck
42 Armed Trawlers destroying German Mines
43 A Trawler blown up by a German Mine
44 Armed Trawlers towing in suspected Boats
45 Armed Trawlers meeting a Zeppelin in the North Sea
46 Brixham Trawler rescuing Survivors of H.M.S. "Formidable."
47 Fleet Attack by Warships
48 A Sad Picture. Trawler coming in flying flag half-mast owing to death of one of the crew at sea
49 Caister Memorial to some gallant seamen
50 "Those who wait." An old salt and his wife listening to a storm
51 A Hopeless Dawn.

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6 Clearing nets at sea.
7 Clearing nets at sea on Deck.
8 Close up view of Catch of Herrings.
9 Herrings being unloaded from hold.
10 Section of drifter unloading herrings.
11 Unloading herrings from drifter on to export ship.
12 Typical Scotch Fisher-girls.
13 Girls "gutting" herrings.
14 Girls hauling barrels of herrings.
15 Salting and packing Herrings in barrels.
16 Packing Herrings for export.
17 Loading up Foreign Boats with Herrings.
18 Boxes of Herrings being loaded for abroad.
19 The Packing Ground on Yarmouth Denes.
20 Fishing Protection Schooner.
21 A Chip of the Old Block.
22 Herring Fleet.
23 Trawler putting out.
24 An East Coast Fisherman.

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5 Bows of Steamer showing latest Bomb-Gun.
6 Old Pattern Harpoon Gun.
7 Attaching net to Buoy.
8 Placing nets to bar the passage between Buoy and Rock.
9 Fastening chain to Rock.
10 Towing out the Whale-Boat.
11 Hauling in the Line.
12 Whale caught in the nets (from a drawing).
13 Boat towed by harpooned "Hump-back" Whale.
14 Endeavouring to lance Harpooned Whale.
15 The dying Whale.
16 Whaler standing on submerged body of dead whale; removing crutch of Harpoon.
17 Unshackling nets from dead Whale.
18 Disentangling nets and getting them aboard.
19 Steamer backing alongside dead Whale.
20 Making steamer's tow rope fast to dead Whale.
21 A typical Whaler. The Chief of the Station.
22 Dead Whale being towed head first.
23 Attaching Wire Winch rope to tail at Slipway.
24 Whale boat crew returning.
25 Sperm Whale hauled up on the Slipway.
26 Head of a huge Sperm Whale.
27 Commencing the cutting-up.
28 After the Blubber has been stripped.
29 Cutting-up the Whale meat.
30 Whalers fishing; hauling up a "Red Schnapper."
31 Whalers fishing; catching a "Hapuka."
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5 Operations in the manufacture of the blade-rings before welding.
6 Manufacturing processes after welding.
7 Rolling together of the welding profile, strengthening-ring, and expansion-ring.
8 Cross-section of a blade-ring with strengthening-rings and seating-rings.
9 Longitudinal section of a 1,000 k.w. Turbine Lower part.
10 Longitudinal section of a large Turbine. Upper part.
11 Cross-section of a turbine-disc.
12 Steam-chest with labyrinth-disc, steam-inlet, overload valve, and steam-outlet from the shaft-packing.
13 Enlarged details of the labyrinth-packing of a dummit-disc.
14 Cross-section of two labyrinth-rings of shaft-packing.
15 Shaft-packing of a 1,000 k.w. Turbine.
16 Labyrinth-ring of shaft-packing.
17 Front view of 1,000 k.w. Brush-Ljungstrom Turbo-alternator.
18 Longitudinal section of a Turbine for 1,000 k.w.
19 Cross-section of a shaft-bearing.
20 Oil-tank with oil-cooler, gear-pump, hand-pump, and pressure regulating valve.
21 Side and end view of a 1,000 k.w. Brush-Ljungstrom Turbine Generator.
22 1,000 k.w. Brush Ljungstrom turbine-generator. The top part of the turbine casing is removed
23 Diagram of Electrical connections.
24 500 k.w. rotor with turbine-wheel for 1,000 k.w. turbine generator.
25 1,000 k.w. turbo-generator with blade-system and steam-chests removed.
26 Turbine-wheel with steam chests of a 1,000 k.w. turbo-generator.
27 Chart showing steps in the calculation of the annual saving in fuel consumption.
28 Chart showing capital value of annual saving in fuel consumption.
29 Detail figures upon which Slide 28 is based.
30 1,000 k.w. "Brush Ljungstrom" Turbo Alternator Set, at the King's Road Station of the St. Pancras Council.
31 2,800 k.w. "Ljungstrom" Turbo Alternator Set.
32 The Turbo-Dynamo Sets installed at Loughborough.
33 Brush Parsons Type, 6,250 k.w. Turbine for 1,500 r.p.m.
34 Rotor and Half Stator of Brush-Parsons Turbine.
35 500 k.w. Turbo Alternator supplied to the Thames Portland Cement Co.
36 200 k.w. Turbo-Dynamo Set.
37 Rotor of a Disc and Drum Turbine.
38 Single phase Turbo Alternator Set of 600 k.w. capacity.
39 Unwound Alternator Stator, showing holes for ventilation.
40. Three Phase High Tension Stator.
41 Stator of Low Tension Alternator.
42 Single Phase High Tension Stator.
43 Steel Forging for Alternator Rotor, with Slots milled from the Solid.
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44 500 k.w. Mixed Pressure Turbo-Dynamo for Folkestone.
45 1,000 k.w. Mixed Pressure Turbine with Tandem Dynamos for Walthamstow.
46 500 k.w. Mixed Pressure Plant.
47 650 k.w. Mixed Pressure Single Phase Turbo Alternator for Uxbridge.
48 800 k.w. Mixed Pressure Turbo Dynamo for the Mersey Railway Co.
49 Section of Mixed Pressure Turbine.
50 One of four 1,000 k.w. Turbo-Dynamos manufactured for the British Admiralty.
51 1,200 k.w. Turbo-Dynamo Set with Single Unit Generator.
52 One of four 750 k.w. Turbo-Alternator Sets for the British Admiralty.
53 Four sets for the British Admiralty on the Test Bed at Falcon Works.
54 Dynamo with three bearings bed-plate and flywheel type belt pulley.
55 "H.G.O." Engine Base type Dynamo with one bearing and half coupling.
56 "H.G.O." Protected Type Direct Current Generator with Belt Pulley.
57 "H.G.O." Type Direct Current Generators, with 2 end shield type bearings and standard belt pulley.
58 Standard Low Voltage Stator, hand wound.
59 Standard 8-pole Revolving Field.
60 Table of Dimensions.
61 Table of Dimensions.
62 Table of Dimensions.
63 "H" Semi-enclosed Type direct current Motor.
64 Dimensions of Brush Standard "H.O." and "H" type direct current motors.
65 Brush Industries Motors.
66 i Wire-wound motor and slip rings for M.S. type motor.
ii Wire-wound rotor
iii Bar-wound stator (Textile type) for large induction motor.
iv Short-circited rotor for M.Q. type motor.
v Bar-wound rotor for large M.S. type motor, showing slip rings with short-circuiting device.
67 i Rotor starting switch and resistance for M.S. type motor.
ii Auto-starter with throw over switch for M.Q. type motor
iii Brush gear for M.S. type motor.
iv Slip rings for M.S. type motor ready for mounting on shaft extension.
68 Diagram showing cross sections of Induction Electric Motors.
69 900 K.V.A. Transformer.
70 i Boiler Plate Tank with External Tubes.
ii Corrugated Sheet Steel Tank.
71 Liquid Starters.
72 Diagram showing cross section of Liquid Starter.

AGU ELECTRIC GENERATING STATION AT LOT'S ROAD, CHELSEA

Plain Slides, 2s. each.

1 Lot's Road Generating Station, Exterior.
2 Coal Elevator and Conveyor.
3 Boiler House showing Automatic Stokers.
4 Main Dynamo Room.
5 Alternating Dynamos.
6 Main Switch Board.
7 Auxiliary Switch Board.
8 Neasden Generating Station. Boiler Room.

For other Slides on "Electricity," see "Science," Section 2, of this Catalogue.

BRB THE STORY OF THE ELECTRIC LAMP.

By kind permission of The General Electric Coy., Ltd.

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Printed notes will be supplied with the Slides.

1 Some early examples of Incandescent Electric Lamps.
2 The Robertson Lamp Works in 1893 and 1905.
3 Processes in the manufacture of the early "Robertson" Carbon Filament Lamp.
4 The earlier form of Osram Lamp with Squirted Filament.
5 The Osram G.E.C. Lamp Works, Brook Green, Hammersmith.
6 A Factory within a factory—one of the "sections" in the Hammersmith works.
7 Lemington Glass Work where Osram bulbs are made.
8 Mixing Room at the Lemington Glass Works.
9 Blowing Osram Bulbs by hand.
10 Blowing Osram Bulbs by Automatic Machinery.
11 Glass Works, Wembley, where tubing for Osram Lamps is made.
12 Machine for mixing the ingredients for making Glass Tubing.
13 Melting Furnace.
14 A Group of Green Glass pots maturing in stone.
15 Tube Furnace showing glass tubing being drawn off Mandrill.
16 Tube Drawing, Cutting and Grading.
17 A process in the treatment of Tungsten Ore.
18 The Modern Alchemist transmutes useless looking stone into invaluable Tungsten.
19 "Swaging" or Hammering Hot Tungsten Bars.
20 Swaging the rods into a thin wire and making the metal more ductile.
21 General view of wire-drawing Department.
22 Gauging the Diameter of Fine Tungsten Wire by weighing a known length.
23 A Group of Tube Flanging Machines.
24 The outer tube of the "foot" is cut from a length of tubing and one end opened out into a kind of bell-mouth.
25 Machine for inserting Filament Supports.
26 "Seal" with the supporting wires inserted.
27 Winding Filament on to Supports for Osram Vacuum Lamp.
28 Winding Filament on to supports for Osram Gas-filled Lamp.
29 Clamping the ends of the Filament to the leading-in wires in the Power pliers.
30 Filament wound on to supports and clamped to leading-in wires.
31 Assembling Bulbs and Filaments. "Sealing-in."
32 "Sealed-in" Lamp.
33 Close up view of Exhausting Machine.
34 Exhausted Lamp ready for capping.
35 Capping Machines.
36 Capped, stamped and finished Osram Lamp.
37 View of Argon Gas Plant.
38 Osram Gasfilled Lamp.
39 Checking Candle Power of Osram Lamps with a Photometer.
40 Final Testing.
41 Packing Osram Lamps.
42 Part of stockroom at the Osram G.E.C. Lamp Works, where a stock of over 3 million Lamps are kept.
43 Valve making. An Assembling Bay.
44 Making the Valve foot.
45 The Research Laboratories of the G.E.C.
46 View of the Vacuum Physics Laboratory.
47 Lamp Life-testing Racks for life tests of Osram Lamps at the Research Laboratories of the G.E.C.
48 One of the Workshops of the Research Laboratories of the G.E.C.
49 The Cricket Team, Canteen and Ladies' Football Team of the Osram Works.
50 The Fire Brigade and First-Aid station of the Osram G.E.C. Works.

AVD THE CONSTRUCTION OF INDUCTION COILS.

A series of Slides to illustrate a Paper read before the Röntgen Society by Mr. R. S. WRIGHT, A.M.I.E.E., Managing Director of NEWTON & WRIGHT, LTD.

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1 Diagram of modern Induction Coil, shewing various parts.
2 The Core of a coil (a) made from a bundle of wires. (b) corresponding section of core constructed of plates.
3 The Rise of Magnetic Flux in an average electro magnet.
4 Primary winding, 3 layer system.
5 Primary winding, sub-dividing in 4 or more sections.
6 Primary winding 1 layer only of flat strip copper.
7 "Tapping" system of adjustment.
8 Parallel Winding Method.
9 Single layer winding shewing tension between the inner wire and the outer-most layer.
10 Two section winding.
11 Secondary winding in flat spirals.
12 Section winding with two insulating partitions.
13 Illustrating the old electrical formula as applied to X-ray currents.
14 X-ray Tube shewing connection between Coil and Mercury Break.

For Slides of X-Ray and Ultra-Violet Rays, see "Medical," Section 1, of this Catalogue.

For Slides on "Electricity" and "Photography by Ultra-Violet Rays" see "Science," Section 2, of this Catalogue.

SLIDE BOXES

Particulars of boxes of all kinds for storing and carrying will be found on pages 847 and 848.

BLX

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1 Egyptian Spirit Ship.
2 Apollo.
3 Viking Ship.
4 Man-of-War, Norman period.
5 Carrack.
6 Battleship of the 17th Century.
7 " Non-such " Ketch. Bow ¾ view.
8 Ditto. Stern ¾ view.
9 " Victory."
10 " Le Sanspareil." Stern view.
11 " " Broadside view.
12 " Le Tonnant."
13 " " Rebuilt.
14 " Dulap Singh."
15 S.S. " Olympic."
16 Waterline Models for Wilton Dock Co.
17 Hero's Wheel.
18 Newcomen Engine.
19 Watt's First Model Engine.
20 Watt's Beam Engine.
21 Murdock's Locomotive.
22 Blenkinsop's Locomotive.
23 " Puffing Billy " Locomotive.
24 " Rocket " Locomotive.
25 Sectional Model of " Rocket " Locomotive.
26 " Rocket " and L.N.W.R. 4-6-0, showing comparative size.
27 " Comet " Locomotive.
28 L. & Y.R. Engine. 0-6-0.
29 Highland Railway Engine. 4-6-0.
30 Nigerian Railway Engine. 4-8-0.
31 Coming of Railways to Africa. (Humorous).
32 Chinese Mallet Engine Locomotive.
33 " Dribbler " Locomotive.
34 " Black Prince " Locomotive.
35 Tinplate " Claughton " Locomotive.
36 Tinplate Engine, Coaches and Track.
37 Press Shop.
38 Spray Painting.
39 Group of Midland Compounds.
40 Group of partly finished wood-work.
41 Assembling Permanent Way.
42 Heavy Tool Shop.
43 Lowering Boiler on to Chassis.
44 Working Cab Fittings.
45 Scale Cab Fittings.
46 Testing G.C.R. 4-6-0.
47 Howey and his " Pacific."
48 Humorous Cartoon. Daddy and Engine.
49 Drake to-day.
50 Meccano. Model of Crane.
51 Primus Engineering. Windmill.
52 Clockwork G.C.R. " Sir Sam Fay."
53 Electric Motor Mechanism.
54 Electric Track.
55 Getting ready for the run.
56 Cartoon " Boy and Salesman."
57 Holders Railway laid on lawn.
58 " waiting for " Right-away."
59 " Engine by lake-side.
60 Boy borrowing petrol for motorist. (Humorous).
61 Howey's 4-6-2 on Cantilever Bridge.
62 Sir Aubrey Brocklebank on G.C.R. 4-6-0.
63 Sprigg's Engine.
64 Footplate Howey's " Pacific."
65 Rounding Cape Horn, Eskdale Rly.
66 Rhyl Miniature Rly. Oiling up.
67 Barmouth Railway and Passenger.
68 Bartholomew's Petrol 4-4-4 Tank and Train.
69 Nord de France 4-6-0. Compound.
70 Netters G.N.R. Engine. 8 ft. single.
71 Mr. Daniells and one of his model boats on Round Pond, Kensington Gardens.
72 Lord Howard de Walden's Battle Cruiser " Queen Mary."
73 " M.E. Overtype," Standard Model.
74 Model Engineer Exhibition General.
75 Mr. Marshall judging exhibits.
76 Group of foreign yachts.
77 Start of Model Yacht Race, Southsea.
78 Finish of Model Yacht Race. The Winning Post
79 Start of Power Boat race, Clapham.
80 Power Boat getting away.
81 " Evil Spirit," running 25 m.p.h.
82 " Sunk."
83 Nobles Speed Boats and Prizes.
84 Pipperroe's Perpetual Motion Engine.
85 Schilowski's Mono Rail. Engine.
86 Allen's Ship Ventilation. Cross Section.
87 Dessau Gas Retort.
88 " Rover " Motor Car Chassis, and Engine and Gears.
89 L. & N.W. Signalling Table. General View.
90 " " Locking Frame.
91 S.S. " La France." Turbine screw propelled.
92 Daimler Ambulance Car.
93 Daimler Staff Car.
94 Daimler Tractor.
95 Immingham Docks.
96 Port Sunlight. General.
97 " Factory.
98 " Church.
99 Daimler-B.S.A. Combination, Works.
100 Flying Ground. Radford.
101 Dayton Cash Register Co.'s Works.
102 Gramophone Co.'s Works, Hayes.
103 Contalmaison. Ruined Village in France.
104 C.P.R. Exhibit of Corn Mills and Works on Lake Shore.
105 L. & N.W. Exhibit of Station, Franco-British Exhibition.
106 East Coast Railway at Brussels. G.N. Express at Speed.
107 East Coast Railway—2nd picture
108 Fighting Fleet of 1893 at Earls Court. General view.
109 " General view.
110 " Cross-section of ship.
111 " Men of War: Torpedo Boats. General.
112 " Close up, showing man in control box.
113 " Depth Charge Exploding.
114 Model Warship Hull. Skeleton (1).
115 " Partly covered (2).
116 Builders of Fighting Fleet.
117 Knots and Hitches.
118 Lashing Spars and Barrel Knots.
119 Group of Water-line Models German Ships.
120 German Warship " Keonig."
121 Collision Patch.
122 Handley Page Aeroplane.
123 German Aeroplane.
124 " Blimp " Airship.
125 Large Tank carrying gun.
126 Half-section of tank.
127 Section of Submarine E 29.
128 Section of French Western Railway. 4-6-0 compound Engine.
129 Holders Railway W.J.B.-L. and Holders Boy by Engine.

Additional Slides are now in course of preparation.

CR HISTORY AND MANUFACTURE OF POTTERY AND PORCELAIN.

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This series of Lantern Slides is selected, photographed and arranged by CHARLES FERGUS BINNS, Esq., Lecturer on "The Potter's Art," "Glass, Antique and Artistic," etc

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1 Egyptian Mural Painting
2 " Painted Pottery
3 " Arybalios
4 " Porcelain
5 Assyrian Cylinder
6 Greek Primitive Pottery
7 " Geometric Pottery.
8 " Archaic Pottery
9 " Fine Pottery
10 Early British Pottery
11 Lake dwellers Pottery I.
12 " " Pottery II.
13 Late Celtic Ware
14 Romano-Teutonic Pottery
15 Roman grey ware
16 Samian bowl
17 Roman decorated ware
18 Chinese blue and white Porcelain
19 Chinese painted Porcelain
20 Japanese Porcelain
21 " Pottery
22 Mexican and Peruvian Pottery
23 Persian Ware
24 Indian Pottery
25 Damasous Ware
26 Rhodian Ware
27 Arabian Lamp
28 Turkish Pottery
29 " Tiles
30 Spanish Majolica
31 Italian "
32 Delft Ware
33 Palissy Ware
34 Nevers Pottery
35 Rouen "
36 Moustiers "
37 German Stone Ware
38 " Tiled Stove
39 Staffordshire Tyg
40 Wrotham Ware
41 Horsham "
42 Fulham Stone Ware
43 Mortlake Pottery
44 Lambeth Delft
45 Burslem Salt glazed
46 Astbury Ware
47 Burslem Moulded Ware
48 Wedgwood Vases
49 " Gems
50 Leeds Pottery
51 Dresden Porcelain
52 Sevres "
53 Chelsea "
54 Bow "
55 Old Derby "
56 Old Worcester "
57 Plymouth "
58 Bristol "

MANUFACTURE.

59 Materials
60 Clay Beds
61 The Mill
62 The Slip House
63 The Thrower
64 Cup and Mould
65 Cups in Seggar
66 Plate making
67 Tile making
68 Hollow-ware pressing
69 The Modeller
70 Figure Makers
71 Vase in mould
72 Parts of figures
73 Completed group
74 The Biscuit Oven
75 Contraction during fire
76 The dipper
77 The warehouse for ornaments
78 Saucers in glost seggar
79 The warehouse for services
80 The Printing Room
81 Copperplate and print
82 Printed patterns
83 The Painter
84 The Banding Room
85 The Gilding do.
86 Plates in Rack
87 Plates on Thimbles
88 The Enamel Kiln
89 The Burnishing Room
90 The packer

MODERN WARES.

91 Minton vase
92 Royal Crown Derby vase
93 Doulton vase
94 Royal Worcester ware

See also "Manufacture of Crockeryware" and "Tiles," page 844.

CS GLASS AND GLASS MAKING.

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1 Egyptian Glass-Blowers
2 " Glass Vases
3 Assyrian Glass
4 Greek "
5 Roman Green Glass
6 " Ornamental Glass
7 " Glass (two pieces)
8 " Millefiore Glass
9 " Cut Glass
10 The Auldjo Vase
11 Anglo-Saxon Glass
12 Glass Beads
13 Greek Mirrors
14 Chinese Glass
15 Syrian "
16 Byzantine Glass
17 Indian "
18 Persian "
19 Arabian Vase
20 Arabian Lamp
21 Venetian Enamelled Glass
22 " Coloured
24 Venetian Clear Glass
25 " Frosted "
26 " Vitro di Trina
27 French Glass
28 Spanish "
29 " Fancy Glass
30 " White "
31 Dutch Glass "
32 " Engraved Glass
33 German Painted Glass
34 " Drinking "
35 " Clear "
36 " Hock "
37 " Mounted "
38 Bohemian Glass
39 Bristol "
40 " White Glass
41 English Drinking Glasses

MANUFACTURE.

42 The Mixing Room
43 Glass Pots
44 The Glass House
46 The Chair
47 Glassworker's Tools
48 The Blower
49 The Marver
50 Forming Work on Blowpipe
51 Work opened on Pontil
52 Making Handle
53 Detaching Work from Pontil
54 Glass Threading
55 Threaded Vases
56 Moulding
57 " (diagram)
58 Moulded Glass
59 The Annealing Oven
60 The Cutting Shop
61 Specimens of Cut Glass
62 Glass Engravers
63 Engraved Glass
64 Rock Crystal Glass
65 Cameo Cutting
66 Carved Glass
67 Cameo Glass

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5 Writing on Papyrus.
6 Old Chinese Bank Note.
7 The Earliest Example of the Use of Paper.
8 Paper Mill of the Sixteenth Century.
9 A Pine Forest in Norway.
10 A View of Honefos.
11 Unloading and Stacking the "Pulp."
12 Gautry Crane at Work.
13 General View of Store Yard.
14 Taking the "Pulp" into the Mill.
15 The "Potcher" Floor.
16 Putting Pulp into the "Potchers."
17 Colouring the Pulp.
18 The "Beater" Room.
19 Pulp entering the Machine.
20 The Pulp passing over the Wire.
21 Paper passing through the First Presser.
22 Paper passing through the Second Presser.
23 Paper passing over the Drying Cylinder.
24 Paper leaving the Drying Cylinder and passing into the Calendar.
25 Paper passing through Calendar on to Reel.
26 The Filter Plant.
27 General View of Machine from Wet End.
28 " " " Dry End.
29 Five-mile Reel just Removed from the Calendar.
30 The "Reeler" used for Measuring and Examining the Roll.
31 Feeding the Reeler.
32 Making Joint after a "Break" has occurred
33 Trimming the Edges of a Reel.
34 The Cutting Machine.
35 Sorting and Packing into Reams.
36 Packing for Export.
37 Store Shed (Fireing).
38 Paper Stored for Home Supply.
39 The Chemical Laboratory.

N.B.—While the Photographs Nos. 9–15 were being taken the Machine, which is 150 feet long, was winding paper at the rate of 500 feet per minute. The size of the paper is 142 inches wide and 5 miles in length, and the weight of the finished reel is 50 cwt.

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5 Silver Book of the Gospels
6 Old Chinese Bank Note
7 A Block for Printing from
8 Page of a Block Book, *Biblia Pauperum*
9 Chinese engaged in engraving a block
10 Chinese Printers at work
11 Earliest dated Woodcut—St. Christopher
12 Fifteenth century Playing Card
13 Pictures from *Biblia Pauperum*
14 Picture from Block Book—Adam and Eve
15 St. John Preaching
16 Caxton a Esop
17 Hans Coster of Haarlem.
18 John Gutenberg—Thorwaisden's Statue
19 Traditional Portrait of John Gutenberg
20 Gutenberg Statue at Mayence
21 Birthplace of Gutenberg at Mayence
22 Gutenberg's first Printing Shop at Mayence
23 Imkre of Piety (to show bad printing)
24 Gutenberg in the Old Monastery, Strasberg
25 Gutenberg's Statue at Strasberg
26 Gutenberg's Statue at Strasburg—another view
27 Gutenberg's Statue at Frankfurt
28 A Manuscript from Bruges
29 First page of the Mazarin Bible in the British Museum
30 Another page of the Mazarin Bible in the British Museum
31 Psalter in Latin, 1457
32 Page of New Testament
33 Letter of Indulgence, dated 1455
34 " " " 1517
35 Old Wooden Press
36 Old Printing Shop, 1639
37 Portrait of Caxton published by Charles Knight
38 Supposed true Portrait of Caxton
39 Caxton's House at Westminster
40 Bas Relief to Caxton at Westminster
41 Caxton in his shop
42 Titl- page of Great Bible
43 Ulric Gearing—Portrait
44 Christopher Plantin
45 Aldus
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47 John Day
48 John Day's trade mark
49 Old Horn Book
50 Group of Printers

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6 Presswork and Composition (1520).
7 " " (1564).
8 A Medieval Press.
9 Type-casting, as practised in 1564.
10 The Engraver in Wood.
11 The Medieval Illuminator.
12 " Bookbinding.
13 The Scriptorium.
14 Type-casting, as practised in 1683.
15 Paper Mill of the Sixteenth Century.
16 Portrait of Peter Schoeffer.
17 John Fust.
18 Thorwaldsen's Statue of John Gutenberg.
19 John Gutenberg, from an old Print in the National Library at Paris.
20 The True Effigies of Laurenx Jans Koster.
21 The Print Colourer.

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3 Advertisement Department.
4 Advertisement Department—another view.
5 Automatic tape machine.
6 Sub-Editors at work.
7 Sub-Editors—Foreign room.
8 Composing room.
9 Composing room—another view.
10 Receiving copy at delivery tube and dispatching proofs.
11 Compositors lifting copy.
12 Composing Display Advertisements.
13 Composing by hand.
14 Intertype Machine—general view.
15 Intertype Machine keyboard. Close up.
16 Monotype keyboards—general view.
17 Monotype keyboards. Close up.
18 Monotype keyboards. Side view.
19 Monotype casting machines—general view.
20 Monotype casting machine. Close up.
21 Dropping headline into galley.
22 Random Room—general view.
23 Double column proof press.
24 Proof reading room.
25 Proof reading.
26 Sorting classified small Advertisements.
27 Sorting classified small Advertisements.
28 Proofing a column of type.
29 Making up—complete columns.
30 Making up a page—sliding type into galley.
30a Making up a page—dropping the chase over type matter.
31 Proofing page.
32 Sliding page into Foundry.
33 Receiving page in Foundry.
34 Making the flong.
35 Rolling the flong.
36 Pressing the flong under steam-drying press.
37 Showing the matrix.
38 Trimming the matrix.
39 Placing the matrix into the dryer.
40 Junior Autoplate machine.
41 Pumping in hot metal and turning on cooling water.
42 The plate produced.
43 The plate being inspected.
44 The Autoshaver.
45 Dispatching the plate to Press Room.
46 Machine Room—general view
47 Machine Room—another general view.
48 View of plate cylinders and paper web being printed.
49 The former and folder.
50 Delivery of papers from machine.
51 The large press.
52 Publishing room.

WP THE BRITISH COINAGE.

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1	Philip II. of Macedon, Stater, the prototype of the Ancient British Coinage	about 279 B.C.	24	Post Conquest Penny, William I. or II.	1066-1087 or 1087-1100
2	Ancient British Gold, Stater, uninscribed	about 150 B.C.	25	" " Stephen	1135-1154
3	" " " Stater, Bodvoc "	30 B.C.	26	" " Edward I.	1272-1307
4	" " " Stater, Verica "	— A.D.	27	" " Gold ½-Noble, Edward III.	1327-1377
5	" " " Stater, Andocomius	about — A.D.	28	" " Groat, Henry V.	1413-1422
6	" " " Quater-Stater, Tincommius "	15 B.C.	29	" " " Henry VII.	1485-1509
7	" " " Stater, Cunobeline "	40 A.D.	30	" " Half-groat, Henry VIII.	1509-1547
8	" " Silver Cunobeline "	40 A.D.	31	" " Shilling, Philip & Mary	1554-1558
9	" " Copper Cunobeline "	40 A.D.	32	" " Crown, Elizabeth	1558-1603
10	Anglo-Saxon Silver Sceatta "	760 A.D.	33	" " Coln, Elizabeth	1558-1603
11	" " Copper Styca, Ethelred	840-848 A.D.	34	" " Crown, James I.	1603-1625
12	" " Penny, Cuthred, King of Kent	798-805	35	" " Sovereign, Charles I.	1625-1649
13	" " " Coenwulf, King of Mercia	794-818	36	" " Crown, Charles I.	1625-1649
14	" " " Coelnoth, Archbishop of Canterbury	830-870	37	" " Half-crown, Charles I. " "	
15	" " " Aelfred the Great	872-901	38	" " £3 gold piece, Charles I. " "	
16	" " " Eadweard the Elder	901-925	39	" " Newark-Shilling, Charles I., Siege piece	1648
17	" " " Aethelstan	925-941	40	" " Pontefract " Charles II., " (Struck after Charles I. death)	1648
18	" " " Aethelred II.	978-1016	41	" " Crown, Cromwell	1649-1660
19	" " " Aethelred II.	978-1016	42	" " " Commonwealth	1649-1660
20	" " " Canute	1016-1035	43	" " " Maundy 4d., Charles II.	1679
21	" " " Harold I.	1035-1040	44	" " Guinea, William & Mary	1688-1694
22	" " " Edward the Confessor	1042-1066	45	" " Farthing, Anne	1702-1714
23	" " Harold II.	1066	46	" " Maundy 4d., George III.	1792
			47	" " Shilling, George IV.	1821
			48	" " " George IV.	1824
			49	" " " George IV.	1826
			50	" " Crown, Victoria, 1847	1837-1901

Note.—For Slides of Ancient Coins, see page 831.

WO HOW THE COIN OF THE REALM IS MADE.

A fine Series of direct Photographic Slides of The Royal Mint, from Negatives made by Special Permission, showing the various processes of manufacture and testing.

Descriptive Lecture for Slides Nos. 1-30, price 2*s.*

(This Reading also contains the Lecture on "The British Coinage.")

Plain Slides, 2s. 3d. each.

1 The Entrance Gates of the Royal Mint
2 ,, Front Elevation
3 ,, Reception of Silver Ingots at the Principal Doorway
4 ,, Weighing and Checking the Ingots
5 ,, Storage of the Ingots in the Strong Room
6 ,, Assay Furnaces
7 ,, Chemical Laboratory (Assay department)
8 ,, Chemical Laboratory (another view)
9 Silver Melting House
10 Gold ,,
11 Casting Silver Bars
12 Rolling Silver Bars into Fillets
13 The Drag Bench
14 Weighing the Fillets
15 Annealing Silver Fillets
16 Cutting Blanks from the Fillets
17 Annealing the Blanks
18 Washing the Blanks
19 Drying and Polishing the Blanks

THE PREPARATION OF THE DIE.

20 Making the Die from the Matrix
21 The Die Turnery
22 Hardening the Die
23 The Finished Die, showing Matrix, Punch and Segmental Collar

STAMPING AND FINISHING.

24 The Coining Press Room
25 ,, Ringer
26 ,, Mangle (examining the face of the Finished Coin,
27 ,, Automatic Weighing Machines
28 ,, Counting Machine
29 The Medal Room
30 ,, Museum

NEW MACHINERY.

31 The Rolling Room. New Electrical Rollers for Making the Fillets.
32 The New Electrical Rollers for Finishing the Fillets prior to Cutting the Blanks.
33 The New Electrical System for Washing the Blanks prior to Coinage.
34 The New Annealing Machine for Sovereigns and Half-sovereigns (now heated by gas).
35 The New Cutting Room. Cutting Blanks from Fillets by Electricity.

CY ANCIENT COINS, ETC.

("KNOWLEDGE" SERIES) *Plain Slides, 2s.*

1 Greek Coins, 28 specimens, (June, 1895)
2 Roman Coins, 32 specimens, (Nov., 1896)
3 Italian Renaissance Medals, 11 specimens (January, 1896)
4 British and English Coins, 43 specimens (May, 1896)
5 English, Scottish, and Irish Coins, 25 specimens (August, 1896)
6 English and Irish Coins, 32 specimens (October, 1896)
7 English Medals, A.D. 1660 (April, 1897)
8 English Coins, A.D. 1660 (August, 1897)
9 Zodiacal Coinage of the Emperor Jahangir (July 1899)
10 The Colours of Cowries (December, 1898)

For other Greek Coins, see "History," Section 6 of this Catalogue.

BIG BREAD MAKING BY MACHINERY.

By kind permission of Messrs. Joseph Baker Sons & Perkins.

Beautifully Painted Slides, 7s. 6d. each.

Plain Slides, 2s. each.

Typewritten Lecture Notes, 2s., or can be loaned with the Slides.

1 Flour blending, etc., with divisions for different flour.
2 Blender Elevator Flour Storage Hoppers and the tops of old-fashioned weighing machines.
3 Flour and Water weighing machine above. Kneader in an American Bakery.
4 Vienna Kneader with Sifter above.
5 Universal Kneaders in an Army Base Bakery in France.
6 An American dough room with first Prover in the background.
7 Dough room of an Army base Bakery in France. Boulogne.
8 Latest Pattern Baker. Perkin's Rotary Division Box Divider with Rotary Spindle. Handing up machine delivering to first reprover.
9 2 Box Rotadibox. Divider delivering to Spindle.
10 Another view of 6 Box divider, hander and prover. Made at Peterboro and Willesden installed in an American Bakery.
11 Direct Driven Automatic Plant (Army Pattern) with Umbrella Moulder.
12 Prover and Spindle Moulding Machine for Small 2 Box plant.
13 Duplex Moulder specially designed for Cottage Bread prover above.
14 Tin bread Moulder and Automatic Tin.
15 Showing the tins after being filled, being passed on to the final prover.
16 Final Prover which is placed above the travelling oven.
17 The largest Bread Oven in the world.
18 Small Bakery W.T. Oven loaves being fed in by hand.
19 Small Bakery W.T. Oven loaves being fed in by hand.
20 Spiral shoot and travelling bread conveyor delivering from travelling ovens.
21 Army Bread being delivered baked from T.O. No operator is required till bread reaches bread room below.
22 Small gas heated T.O. in 300 sack per week English Bakery.
23 Gas heated Metal Cased travelling oven.
24 Bread delivered automatically into Baker-Dean travelling cooler.
25 Showing fully cooled bread automatically delivered to belt conveyor after being cooled on the Baker-Dean.
26 At the wrapping machines. Return conveyor in foreground for convenience of men loading machines.
27 Bread wrapping machine.

A'PN THE STAFF OF LIFE.

Plain Slides, 2s.; Beautifully Painted, 7s. 6d. each.

Reading, 1s.

Standard Bread—How it is made and why.

Introductory Slide—"Standard Bread or nothing."
1 Wheat Berry showing Germ.
2 Microphotograph of inner Bran.
3 Microphotograph of Germ.
4 Doctor's Manifesto.
5 Baking Standard Bread, Brompton Hospital Sanitorium.
6 Patients drawing Rations of Standard Bread.
7 Consumption Scourge in Wales.
8 Statement made by Dr. Kaye, D.P.H., F.C.S., M.O.H.
9 King George V.
10 Making Standard Bread for the King by a Windsor Baker.
11 Baking Standard Bread for the King by a Windsor Baker.
12 Sending Standard Bread to Windsor Castle.
13 H. M. Abbeti—Baker to the King at Windsor Castle.
14 Home made Standard Bread—Grinding Wheat.
15 Home made Standard Bread—The Loaves Finished.
16 Making Bolting Cloth on Hand Loom, Blyth Mill.
18 Old Stone Grinding—Lincolnshire Mill.
19 Cranbrook Union Mill.
20 Help-Out Mill, Shakerstone.
21 Old-Fashioned Water-Power Country Mill.
22 Entrance to Old Burton Abbey.
23 Old Door to Mill, Burton Abbey.
24 Wall in Burton Abbey Mill.
25 Corner of Burton Abbey Mill.
26 Corner of Grinding Room, Burton Abbey Mill.
27 Dressing a Mill Stone.
28 Grinding between Stones.
29 Standard Flour leaving Grinding Stones.
30 Taking off Flour in Sacks after Grinding.
31 Machine for taking out Bran and Dressing.
32 Tons of Standard Flour.
33 Loading up Flour.
34 Standard Bread Dough in troughs.
35 Half-Ton Standard Bread Dough.
36 Cutting up and Weighing by Machinery.
37 Baking in Great Oven.
38 Packing Standard Bread.
39 Baker with Specimen of Standard Bread.
40 Local Government Report.
41 Miss May Yates and the Queen's Letter.
42 The Queen.

BVQ THE BISCUIT INDUSTRY.

From a series of original negatives, by kind permission of Messrs. McVitie & Price, Harlesden, London.

Plain Slides, 2s. each.

Typewritten Reading, 2s. 6d., or may be loaned with the Slides.

1 Canadian field of wheat.
2 Mowing Machine.
3 Carrying corn.
4 Flour Mill.
5 Flour Mill.
6 Dairy Farm.
7 Dough Mixer.
8 Dough Brakes.
9 Cutting and Embossing Machine.
10 Feeding the Ovens.
11 " "
12 " "
13 Biscuits leaving ovens and cooling racks.
14 Moving Biscuits from Ovens.
15 Back of Ovens and cooling racks.
16 " "
17 Packing in packets. "
18 " "
19 Packing Butterette Biscuits.
20 " " in packets.
21 Packing Assorted Biscuits.
22 Labelling tins.
23 Hand bakery and ovens.
24 Blanching almonds and cleaning fruit.
25 Icing Wedding Cake.
26 Duke of York's Wedding Cake.
27 Princess Elizabeth's Christening Cake.
28 Sandwiching Biscuits with Cream.
29 Icing Fancy Biscuits.
30 Chocolate Milling.
31 Coating biscuits with chocolate.
32 Finishing touches to chocolate biscuits.
33 Packing chocolate biscuits.
34 Labelling and wrapping tins. Chocolate department.
35 Making wafers.
36 Making wafers cutting into shapes.
37 Baking Oatcakes.
38 Warehouse and putting up orders.
39 Loading Motor vans for local deliveries.
40 Presenting Duke of York to McVitie and Welsh Boys Football Teams.
41 Duke of York presenting medals.
42 Canteen (Women).
43 A Popular showcard.
44 In Arctic regions and Mr. Binney's letter.

ABM THE MANUFACTURE OF GAS.

Or, WORK IN ONE OF THE GREAT LONDON GAS WORKS.

Plain Slides, 2s. each.

1 Discharging Coal.
2 The Coal Store above the Retorts.
3 Section of the Retorts (Charges). Number of Retorts in all, 2,040.
4 Drawing Coke from the Retorts.
5 West's Charging Machine for filling the Retorts.
6 Discharging Retorts, showing the Co-partner Pusher.
7 The Retorts in Construction.
8 One of the Coke-holes.
9 The Condensers.
10 Exhaust Engine House.
11 The Washers.
12 The Scrubbers.
13 The Purifiers.
14 Purifiers. Underside.
15 One of the Covered Meters, registering the amount of gas made.
16 An Uncovered Meter.
17 Gauge Room.
18 The Governor for Regulating the supply of Gas to be consumed.
19 Gas Works, Stoking the Retorts of a great Gas Works.
20 Coal Store above Retorts.
21 Breeze Screen and Washer
22 The Coke Yard.
23 A Gasometer.

See also "Some British Industries," page 834, No. 5.

BVG MINING MACHINERY.

Messrs. NEWTON have pleasure in publishing this extremely interesting group of pictures kindly supplied by Messrs. Holman Bros.

Coloured Slides, 6s. 6d. each.

1 Holman Hammer Drill. Slate Quarrying, North Wales.
2 ,, Drill, Slate Quarrying, North Wales.
3 ,, Hammer Drills, Slate Quarrying.
4 ,, Hand Hammers, Quarrying.
5 ,, Hammer Drill, Quarrying.
6 Deep Hole Quarrying with Holman Hammer Drills.
7 Holman Hammer Drills, Quarrying, Operated by Holman Portable Compressor.
8 ,, Hammer Drills. Stoping.
9 ,, Hammer Drills. Cutting Dimension Slate.
10 ,, Road Rippers and Portable Compressor.
11 ,, Hammer Drills. Tin Mining.
12 Deep Hole Drilling in an open cast. West Africa.
13 Holman Hammer Drill with Kaffir Operator. South African Mines.
14 ,, Hammer Drill with Kaffir Operator. South African Mines.

Plain Slides, 2s. each.

15 Holman Hammer Drills with Kaffir Operators. South African Mines.
16 ,, "W.L.B." with Kaffir Operator. South African Mines.
17 ,, Hammer Drill with Kaffir Operator. South African Mines.
18 ,, Drill. Deep drilling in an open cast. West Africa.
19 ,, Steam Driven Drill. Quarrying.
20 ,, Reciprocator. Quarrying. Starting a 20 ft. hole.
21 ,, "W.L.B." mounted on Bar. South African Mines.
22 ,, Hoist with Kaffir Operator. South African Mines.
23 ,, 500 cub. foot Compound Steam 2 Stage Compressor of "Illumsar" Mine Ramtek.
24 ,, Hoist with Kaffir Operator. South African Mines.

AQE AMONGST THE SLATE MINES OF NORTH WALES.

J. C. BURROWS, F.G.S., F.R.P.S.

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3 Underground Chamber, showing Pillars.
4 Underground Chamber, showing 86 feet Ladder.
5 Working Sides of Chamber from Ladders.
6 Fixing Stays and Ropes to erect long Ladder.
7 Man with Light Inspecting Roof of Chamber.
8 Working on Top of Forebreast of Chamber.
9 A Mill at the Oakeley Slate Quarry.
10 Entrance, Workings, Votly and Bowydd Slate Quarries.
11 Drawing Slate Waggons up Incline by Water Balance.
12 Openings to Daylight in Llechwedd Quarry.
13 Method of Securing Roof in Llechwedd Quarry.
14 Stairway in Worked-out Chamber in Llechwedd Slate Quarry.
15 A Deep Chamber in the Llechwedd Quarry.
16 Underground. Drilling, Pillaring and Splitting Holes.
17 Top of Forebreast, Showing Men at Work.
18 Type of Timber Truss Bridge, Spanning Chamber.
19 View of Bottom of Chamber from Bridge above.
20 Miners preparing Ground for Rock Men.
21 Slate Mill, Floor 5, showing Machinery.
22 Squaring Slabs of Slate.
23 Slate Spitting and Dressing.
24 Shipping Slate at Portmadoc.
25 Portmadoc Railway, 23½-inch gauge.
26 Slate ready for use.

For "Coal Mining" and "Tin and Copper Mining" see "Geology," Section 4 of this Catalogue. For "Granite Quarries," see page 844.

APL THE DIAMOND MINING INDUSTRY.

Beautifully Coloured Slides, 7s. 6d. each. *Plain Slides, 2s. each.*

1 Early prospectors under Canvas.
2 ,, ,, at work, 1870.
3 Mine rope and road ways, 1872.
4 Kimberley. Market Square. [Floors.
5 ,, and city of shacks and the Washing
6 Washing and Puddling Machine, 1872.
7 The Mine with cobwebs of wire ropes, 1873.
8 East Face of the Mine.
9 Winding apparatus worked by Mules, 1874.
10 Vaal River, 1874.
11 Puddling Machine and dredger on Ox Wagon.
12 ,, worked by Steam Engine.
13 The Washing Floors.
14 Hand Washing. 1876.
15 View of the Schuller Mine, 1880.
16 Sydney on Vaal. Break-water. 1880.
17 Blasting.
18 Effects of Blasting. A Huge Pit.
19 An Open Cut or Pit.
20 No. 2 and 3 Mine, showing thin wall dividing.
21 No. 3 Mine from the top of No. 2.
22 No. 2 Mine showing tunnel connecting No. 3.
23 View of the Railway to Kimberley.
24 Puddling Machine. Close up view.
25 Surface workings.
26 Extensive view of one of the Mines.
27 Rope tram-way. General view.
28 ,, ,, Close up view.
29 Tram-way across the Floors.
30 Depositing Floor.
31 Mining Machinery for Washing and Crushing.
32 Washing Plant, Engine House and Slack heaps.
33 General view of Mine Shaft and Compounds.
34 Washing and Crushing Machinery. Inside.
35 Washing Machinery. Inside showing vats.
36 Pulsating Machinery. Inside.
37 Searching Gravel in the Vaal River.
38 Convicts searching Gravel.
39 Searching Tables.
40 Heap of rough Diamonds.
41 Rough Diamonds. Examples.
42 The Compound. General view.
43 ,, ,, Morning Toilet.
44 ,, ,, Washing Day.
45 ,, ,, Bread Waggon.
46 ,, ,, Dinner time.
47 ,, ,, Types of Kaffirs. [Diamonds.
48 ,, ,, Searching Kaffirs for concealed
49 Uncut Diamond showing squares. Photo-micrograph.
50 ,, ,, ,, triangular crystals. Photo-micrograph.
51 Cullinan Diamond, showing one of the great cleavage planes.
52 ,, ,, After first polishing.
53 ,, ,, After splitting and finished specimens.
54 ,, ,, As finished.
55 ,, ,, compared with other famous Diamonds.
56 London. Sorting Diamonds.
57 ,, Polishing and Setting.

BVL THE MANUFACTURE AND USES OF PORTLAND CEMENT.

By the kind permission of the Associated Portland Cement Manufacturers, Ltd.

Beautifully Painted Slides, 7s. 6d. each. Plain Slides, 2s. each.

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1 Digging chalk with steam navvies.
2 Digging clay with crane and grab.
3 View of Washmills.
4 Tipping chalk and clay into Washmills.
5 General View of slurry storage and mixing tanks.
6 View of Rotary Kilns.
7 Firing end of Rotary Kiln.
8 Battery of Rotary Coolers.
9 End view of Rotary Cooler.
10 Heap of fresh Rotary Kiln Clinker as it leaves the coolers.
11 Transporter carrying clinker to the Grinding mills.
12 View of Grinding Mills.
13 Power House.
14 A.P.C.M. Central Testing Laboratory, Portland House, Westminster.
15 Filling Cement into bags from storage silos.
16 Loading Cement into steamer with electric cranes.
17 General view of modern Cement works (Kent Works, Stone, Greenhithe).
18 Nile Dam at Assuan.
19 Nile Barrage at Assiut. [Concrete.
20 "Atlantes"—figure personifying the strength of
21 Open-air concrete swimming bath at Scarborough.
22 "Vantage" Concrete Tennis Court (porous).
23 Concrete Circular Tank.
24 Concrete Gate Post, showing struts and base plates.
25 Country lane showing Concrete Gate Posts.
26 Concrete post and rail fencing.
27 Showing concrete block making machine being operated.
28 East Cliff Gardens, Ramsgate. View of sun shelter in Cast Stone.
29 Concrete Grand Stand for Race Course, Longchamps, Bois de Boulogne, Paris.
30 Spanish type bungalow in Los Angeles, California.
31 Art Gallery at Nashville, U.S.A.
32 Interior of Reinforced Concrete Church (St. Francois d'Assise), Lyons.
33 Cappalen Memorial Bridge, Minneapolis.
34 The Stadium, British Empire Exhibition, Wembley.
35 Bridgewater to Taunton Main Road.
36 Canmore Street, Dunfermline.
37 Glebe Island Bridge Road, Sydney, Australia.
38 East to West Road, Surrey.
39 Photomicrograph of Chalk.
40 ,, Clay.
41 ,, of Mixture after passing through Rotary Kiln.
42 ,, Slurry.
43 ,, Cement.

ABL SOME BRITISH INDUSTRIES.

Beautifully Painted, 10s. each. Plain Slides, 2s. each.

1 Reading Room, British Museum.
2 Railwayman Lighting the Signal during the Storm.
3 Scene on the Platform before the Departure of a Mail Train.
4 A Forlorn Hope, Miners Descending to the Rescue of their Companions.
5 Gas Works. Stoking the Retorts of a Great Gas Works.
6 St. Pancras Electrical Staton, Interior of Electrical Distribution Station.
7 Inside the Iron Works, Men Working at Molten Iron.
8 Inside the Iron Works, Hardening 12 in. A Tube for 50-calibre gun.
9 Hammering out a Steel Bar with a Steam Hammer.
10 Soap-making. Boiling the Soap.
11 Jewish Market in Whitechapel.
12 Covent Garden Vegetable Market, Early Morning Scene.
13 Covent Garden Flower Market, Early Morning Scene, Flower Girls Buying Flowers.
14 Grimsby Pontoon, Interior of Fish Sheds.
15 Girls at Work in a Laundry, The Washing Room. No. 1.
16 Cigarette-making Industry, Girls at Work.
17 The Pool of London. A Busy Scene.
18 Boiling sugar on roof of Factory.
19 Inside a cotton Mill.
20 North Sea Fisheries. Captain of the s.s. "Magpie."
21 North Sea Fisheries. Officers of the s.s. "Magpie."
22 North Sea Fisheries. Crew of the s.s. "Magpie."
23 North Sea Fisheries. An early morning catch.
24 North Sea Fisheries. "The Admiral of the Fleet" and his dog.

BUV THE ROMANCE OF DYEING AND CLEANING

This interesting group of Slides will be found to illustrate the enterprise and skill of the famous Dyeing and Cleaning processes of Messrs. Pullars of Perth.

Beautifully Painted, 7s. 6d.; Plain Slides, 2s. each.

Printed Notes can be supplied with the Slides.

1 View of Lace Curtain Room.
2 Bedspread Ironing and Finishing.
3 View of Stain Removing Department.
4 China Glazing Room.
5 Tailors Repairing Gents' Clothes.
6 Stain Removing.
7 Re-touching of Beads on dress.
8 Dyed Silk Ironing with Electric Irons.
9 Hat Blocking and Renovation.
10 Finishing of length of material after dyeing.
11 Re-blocking of Hats after Cleaning.
12 Glove repairing by hand.
13 Glove repairing by machinery.
14 Raising the pile on velvet.
15 Feather dressing and curling.
16 Ironing of pleated dresses.
17 Dress Retouching.
18 Curtain Repairing.
19 Spraying colour on shoes.
20 Stockings finished and shaped by steam heating on aluminium shapes.
21 Large calender machine.
22 Group of men who have been in the service of Pullars for more than 50 years.
23 Van unloading at Perth Station.
24 Works at Perth. Largest cleaning and dyeing works in the world.

It is hoped to add other Slides to this series.

AEV THE TANNING INDUSTRY

From a Series of Direct Negatives recently taken in a large Bermondsey Tan-yard, showing the modern processes of Tanning

 Plain Slides, 2s. each.

1 Leather Market.
2 Receiving Raw Goat Skins in Store.
3 Soaking and Lining Goat Skins.
4 Taking Hair off Goat Skins with Sleaker.
5 Washing Hair Wool.
6 Drench House.
7 Soaking and Lining Seal and Calf Skins.
8 Unhairing Seal Skins.
9 Splitting Sheep Skins.
10 Shumac Tanning.
11 Seal Tanning.
12 Paddles for Tanning.
13 Striking Skins after Tanning.
14 Crust Warehouse.
15 Machine Shaving.
16 Brush Machine.
17 Tumbling Skins.
18 Preparing for Dyeing.
19 Fluffing Wheels.
20 Ironing Skins by Electric Irons.
21 Preparing Skins for Finishing on Grasshopper Machine.
22 Glazing Machine.
23 Wheel Glazer.
24 Printing Grain in Skins.
25 Finishing.
26 Splitting Skins on Band Knife Machine.
27 Colour Striking Out.
28 Setting Seal Skins.
29 Measuring Machine.

ADDITIONAL SLIDES ON "TANNING"

By Roland Gorbold.

Plain Slides, 2s. 6d. each.

30 Raw Hide and a Finished Chrome Side
31 Lime Pits
32 Unhairing
33 Fleshing and Scudding
34 Tanning Drum
35 Splitting
36 Shaving
37 Staking
38 Graining

BAA BOOT MAKING.

By Roland Gorbold.

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Printed Lecture, price 1s. 6d.

1 Making the Model Last.
2 Roughly turned Block.
3 Turning Lathe.
4 Last Turned.
5 Bench Knife.
6 Band Saw removing Block.
7 Last with Block removed.
8 Bottom Plate.
9 Fixing the Plate.
10 Finishing Lasts on Sandpaper Wheel.
11 Finished French Last.
12 Finished British Last.
13 Pattern Cutting.
14 Clicking, Cutting out the Uppers.
15 Parts of Upper.
16 Skiving Parts of Upper.
17 Closing.
18 Eyeletting.
19 Closed Upper.
20 Revolution Press Cutting Soles.
21 Rex Pull-over Machine.
22 Upper pulled over Last.
23 Consol Lasting Machine.
24 Boot Lasted.
25 Rivetting on Undersole.
26 Boot Riveted.
27 Billing Soles.
28 Soles Billed.
29 Stitching the Soles to Undersoles.
30 Screwing.
31 Boot with Sole on.
32 Levelling by Rolling.
33 Direct Pressure Levelling.
34 Edge Trimming.
35 Heeling.
36 Slugging.
37 Boot with Heel on.
38 Heel trimming.
39 Heel Scouring
40 Edge Setting.
41 Finished British Regulation Boot.
42 Boot Lasted for Welting.
43 Sewing in the Welt.
44 Boot with Welt Sewn in.
45 Boot with Welt in.
46 Sole stitched on.
47 Blake Sole Sewing Machine.
48 Hand Lasting.
49 Team of Hand Welt Sewers and Stitchers.
50 Cordwainer Sewing in Welts.

AQV MANUFACTURE OF BEETROOT SUGAR.

Plain Slides, 2s. each.

1 Warehouse, Washing Beets.
2 The Sampling Laboratory.
3 Erecting Diffusers.
4 Series of Diffusers.
5 Filter Presses.
6 Carbonizing Machinery.
7 Quadruple Evaporation.
8 The Raw Sugar Room.
9 First Series of Turbines.
10 Second Series of Turbines.
11 Boiling down of By-products.
12 The By-product Turbines.
13 The Crystallizing Boilers.
14 Filling the Sugar-loaf Receptacles.
15 Turbines in the Sugar-loaf Refinery.
16 Shaping the Loaves.
17 Wrapping the Loaves.
18 The Boiling Room for Sheet or Block Sugar.
19 Filling the Moulds.
20 The Filling Hall.
21 Turbines in the Sheet Refinery.
22 Unmoulding the Sheets.
23 The Cutting-up Hall.
24 Packing Sugar.
25 Weighing and closing down.
26 Splitting the Sugar.
27 Splitting into cubes.
28 Bolting Mill. (Pulverization.)
29 Packing Department.
30 The Store House.

ASD BREWING.

Plain Slides, 2s. ; *Beautifully Painted*, 7s. 6d. *each* ; Reading, 2s.

1 Hop Garden with Poles
2 Hop Garden with Iron Wire
3 Opened Hop Garden
4 Pruning Hop-bind with Knife
5 Pruning Hop-bind with Knife
6 Hop Pickers
7 Hop Pickers
8 Granary
9 Silos on Granary
10 Machine for dividing the Grain
11 Malt House
12 Malt Kiln.
13 Mash Tub—Malt taken out
14 Yeasting Tub
15 Filling Casks for Fermentation
16 Fermentation in Casks
17 Small Fermentation Cellar
18 Cooperage
19 Mechanical Cleaning of Tuns

ZR WORK IN A LONDON BREWERY.

From Direct Negatives.

Beautifully Painted, 7s. 6d. *Plain Slides*, 2s. *each.*

1 The Tumblers used for washing the Casks.
2 The Mash Tuns.
3 One of the Stout Cellars.
4 Porter Tun-room.
5 The Refrigerator.
6 Fermenting Vessel.
7 ,, ,, (Interior).
8 The Hop Floor.
9 The Cooperage.
10 Coppers for Brewing Porter and Stout.
11 Cask Making.
12 Steaming and Cleaning Casks.
13 The Stable Yard.
14 Ale Fermenting Vessels.
15 Mash Tuns (Interiors), showing the Rakes.
16 The Liquor Rack (capacity 681 barrels).
17 One of the Ale Cellars.
18 Cask Elevators.
19 Malt Cases.

BVH ADDITIONAL SLIDES ON BREWING.

By kind permission of Messrs. Watney, Combe Reid & Co.

Plain Slides, 2s. *each.*

1 Maltings Wharf
2 Grain Drying Machines at the Stag Brewery.
3 Cold Room. X Stores. Mortlake Brewery.
4 Bottling Stores. Mortlake Brewery.
5 Bottling Stores. Mortlake Brewery.
6 Loading Out Stage. Mortlake Brewery.
7 Girls' Messroom. Mortlake Brewery.

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CQ ROPE AND TWINE MAKING.

Beautifully Coloured, 7s. 6d. *each* ; *Plain Photographs*, 2s. *each.*

Reading, 1s.

1 Introductory Slide with Title.
2 View of the Works exterior.
3 An Engine House interior.
4 Ropemaking, "Hackling."
5 ,, Preparing Hemp.
6 ,, "Spreading."
7 ,, Hand Spinning.
8 Ropemaking, Machine Spinning
9 ,, the Yarn Store.
10 ,, by House Machinery
11 ,, in Ropewalk.
12 The Rope Store.
13 Twinemaking, Carding Machine.
14 Twinemaking, Drawing.
15 ,, Spinning.
16 ,, Scouring.
17 ,, Balling.
18 Sash Cord & Log Line Making.
19 The Packing Room.
20 The Hands leaving work.

BRP CANDLE MAKING.

By kind permission of Price's Patent Candle Co., Ltd., London.

Plain Slides, 2s. *each.*

1 Introduction.
2 Portrait of James Young.
3 Raw Materials at Wharf.
4 Glycerine, a by-product.
5 Barrels of raw materials.
6 Making the wicks.
7 Lowering the wicks into the wax.
8 Pouring composite wax into the vats.
9 Hardening the Candles.
10 Making night-lights.
11 Packing.
12 Trimming.
13 Stamping Tablets of Soap.
14 Engineers' Shop.
15 Making Packing Cases.
16 Girls packing night-lights.
17 Candle Packing Room.
18 Printing Room.
19 Stores.
20 "Good-night!"

It is hoped to add further Slides to this series.

B W G SOAP MANUFACTURE.

(Messrs. Lever Bros., Ltd.)

Messrs. NEWTON are glad to publish the following Slides illustrating the well-known works of Messrs. Lever Bros., Port Sunlight.

This fine series of Pictures will be found particularly interesting and instructive. A typewritten reading can be supplied, price 2s. 6d., or can be loaned with the Slides.

Coloured Slides, 6s. each. *Plain Slides, 2s. each.*

1 Aerial view. Port Sunlight Works.
2 ,, ,, Port Sunlight Village and Dock Scheme.
3 First Shop at Wigan.
4 Lever's Pacific Plantations. (Solor on Isles.)
5 Native women breaking Palm Nuts.
6 Primitive method of extracting oil.
7 Kinshasa, Belgian Congo.
8 Part of the Wharf, Port Sunlight.
9 One of the walls, New Docks, Bromborough.
10 The Oil Mills.
11 Soap Boiling.
12 Cutting into slabs.
13 Cutting into Bars.
14 Soap stacked to dry.
15 Soap Stamping.
16 Soap packing. Sunlight.
17 Soap packing. Lifebuoy.
18 Soap packing. Lifebuoy.
19 Wrapping. Monkey Brand.
20 Wrapping. Monkey Brand.
21 Canister Making for Vim, etc.
22 Canister Making. Feeding rolls of card to the machine.
23 Canister Making. Stamping out tin tops.
24 Vim packing and filling.
25 Dry Soap making.
26 Toilet Soap milling.
27 ,, ,, ,, View of the room.
28 Toilet Soap Packing.
29 Wood Box Printing.
30 Wood Box Nailing.
31 Printing Department.
32 View of Laboratory.
33 Vinolia Works.
34 ,, ,, Filling Toothpaste and Shaving Cream Tubes.
35 Toronto. Lever's Works.
36 Sydney. ,, ,,
37 Lyceum. (Staff Training College), Port Sunlight.
38 Sports Pictures. (Scenes at Thurstaston Camp).
39 The Recreation Ground, Port Sunlight.
40 Operatic Society (Miss Hook of Holland).
41 The Bridge Inn.
42 Lady Lever Art Gallery.
43 The Late Viscount Leverhulme.
44 Royal Visit.

B V I THE HISTORY OF MATCHES AND MATCHMAKING.

We are indebted to Messrs. Bryant & May, Ltd., for kind permission to publish the following interesting group of Slides.

Many of the pictures have been reproduced from exhibits in their Museum of Fire Making Appliances and are a special feature of the set. Other Slides depict the up-to-date methods of reproduction employed in their factory at Bow.

Lecture Notes have been prepared from their official publications and typewritten copies can be supplied, price 2s. each, or can be loaned with the Slides.

Beautifully Painted Slides, 7s. 6d. *Plain Slides, 2s.*

1 Two celebrated Shops in Stockton High Street.
2 The Brass Tablet denoting site of Mr. Walker's Shop.
3 The First Entry of Sale of Friction Matches.
4 John Walker's Mortars and Pestles.
5 View of John Walker's Residence.
6 Front and side section of one of John Walker's Matches. The exact size.
7 The Bryant & May Museum of Fire Making Appliances.
8 A Fire Drill.
9 Flint and Pyrites.
10 The Flint and Steel Method.
11 The Quartzite and Iron Method.
12 Sulphur Matches.
13 Household Tinder Box.
14 "The Light of Olden Times."
15 Wheel Lock Tinder Box.
16 Tinder Pistol.
17 Wheel Tinder Boxes.
18 Fire Pistons.
19 Instanteous Light Box.
20 The Promethean Match.
21 The Dobereiner Lamp.
22 The Lucifer Match. Samuel Jones's early advertisement.
23 Watts' Chlorate Match.
24 An Advertisement of Olden Times.
25 Timber stacked in the yard.
26 Timber. Near view.
27 Log Cutting.
28 Close up of saw; being sharpened.
29 Logs being barked.
30 Log Elevator.
31 The Peeling Room.
32 Veneer being chopped into splints for Matches.
33 Safety Impregnating Plant.
34 The Match Room. "Getting their Heads."
35 ,, ,, ,, "Drying off."
36 Veneer being chopped into lengths for Match Box Making.
37 Making Box Covers.
38 Making Box Inners.
39 Fitting Inners into Outers.
40 Printing Match Box Labels.
41 Pasting on the labels and packing in dozens.
42 Case Making.
43 View of Works showing fleet of Motor Vans.
44 Power House.
45 Engineers' Repair Shop. [Works.
46 Entrance to Messrs. Bryant & May's Fairfield
47 Men's Club, Fairfield Works.
48 ,, ,, at Liverpool.
49 The Visit of H.M. the King to Fairfield Works

BVK THE TEA INDUSTRY.

Messrs. NEWTON are indebted to Lt.-Col. B. A. Haddick, F.R.G.S., the well-known Explorer and Lecturer, for permission to reproduce the Slides from a series of original Negatives.

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Typed Lecture Notes for Slides Nos. 1-38, price 2s. 6d., or can be loaned with the Slides.

1 General view of Tea Gardens and Planter.
2 Planting Seed in Seed beds.
3 The Nursery.
4 Manager's Bungalow.
5 Transplanting into Nursery.
6 Transplanting from Nursery.
7 Young Extension.
8 Liming and Hoeing.
9 Spraying.
10 One Year Old Tea.
11 Light Pruning.
12 Heavy pruned Plot of Tea.
13 Fully grown plants.
14 Coolies returning to the Lines.
15 Distributing Rice to Coolies.
16 Pay Day.
17 Plucking Tea Leaf.
18 Bringing in the tea from the outer gardens.
19 Coolies carrying Tea into Withering Sheds.
20 Weighing in.
21 The Withering Shed.
22 Withering.
23 Bringing Withered Tea into the Factory.
24 The Factory, No. 1.
25 The Rolling Machine.
26 The Drying Machine.
27 Tea Fermenting.
28 Bulked Tea in Factory.
29 Sorting Machine.
30 Sorting.
31 Making Tea Chests.
32 Packing.
33 Mechanical Packer.
34 Chests open for inspection.
35 Despatching Tea from Factory on trolleys.
36 Despatching Tea from Factory by Bullock Carts
37 Loading Tea on to Train.
38 Exporting at Docks.
39 Preparing to transplant from Nursery.
40 Staking.
41 Coolies' Lines.
42 Hospital.
43 The Factory. No. 2.
44 The Factory. No. 3.
45 The Boiler.
46 The Engines.
47 The Automatic Stoker.
48 Paragon Drying Machine.
49 "Automatic Sirocco" Drying Machine.
50 Kitcha Sorting.
51 Mechanical Bulker.
52 Hand Bulker.
53 Marking Tea Chests.
54 Landing Tea from River Float.

ADDITIONAL SLIDES.

ARRIVAL IN LONDON AT THE BONDED STORES.

55 The Steamer at the Quayside.
56 Loading Chests of Tea from the hold.
57 Hoisting from the hold on to truck.
58 Loading on to Truck.
59 Weighing the Chests.
60 Stacking in the Stores.
61 Samples opened for examination. Grade I.
62 Samples opened for inspection. Grade I.
63 Stacks of Tea in Store.
64 Sample Room. Chests of Tea opened.
65 Tea stocked in Stores.
66 Tea Blenders. Making Tea.
67 Tasting the Tea.

AQY CULTIVATION OF COFFEE IN MEXICO.

Beautifully Painted, 7s. 6d.; Plain Slides, 2s. each.

1 Clearing the Ground (beneath Matapala Trees).
2 Planting the Seed.
3 Weeding and Shading the Young Plants.
4 Transplanting the Young Trees.
5 A Full-grown Coffee Tree (14 ft. high).
6 Coffee Tree, in Blossom.
7 A Coffee Plantation at Las Nubes.
8 Harvesting Coffee (general view).
9 " (near view).
10 Bringing in the Day's Crop.
11 Spreading the Berries to Dry.
12 Turning over the Berries in the Sun.
13 Cultivators at Dinner.
14 Loading Sacks of Coffee for Export.
15 Coffee-planter's Residence.
16 Drying Coffee at San Felipe.
17 Hacienda and Workers at San Isidore.

BN SUGAR INDUSTRY.

Beautifully Painted, Figures 8s. 6d.; Views, 7s. 6d.; Plain Slides, 2s. each.

SOUTH AMERICA.

1 Pernambuco. Bullock Sugar Carts outside store.
2 " Sugar Mills, Cane Crushers.
3 " Sugar Mill, showing machinery.

HAWAIIAN ISLANDS.

4 Lihwe. A Sugar Village.
5 The Sugar Process. Ploughing.
6 " " " Cutting the Cane.
7 " " " Putting Cane in the flume.
8 " " " The flume on the way to mill.
9 " " " End of the flume.
10 " " " Cane entering the mill.
11 " " " Crushing.
12 " " " Boiling.
13 " " " Drying.
14 " " " Weighing.

WEST INDIES.

15 Buono Intente Estate. Mill.
16 " " " Mill interior. Canes brought in.
17 " " " Carrying the Canes.
18 " " " Canes in Waggon.
19 Buono Intente Estate. Cutting the Cane.
20 Canada. Gathering Maple Sap.
21 Meerut, India Sugar Crushing.

FIJI ISLANDS.

22 Lautoka, The Wharf.
23 " " ss. "Rakaia" (of the N.Z. Shipping Co.)
24 " A field of Sugar-cane belonging to the "Colonial Sugar Co."
25 " In the sugar fields.
26 " " " Women working.
27 " " " Showing cart.
28 Suva, Outrigger Canoe.
29 A Dried-up Stream, the banks overgrown with Sugar-cane.
30 A Coolie woman planting Sugar-cane, with a European Overseer superintending.
31 Coolie women at work in the Sugar Fields. All the labour is done by coolie men, women, and children imported from India. The native Fijians are too few and too lazy.
32 Coolie Women.

For other Slides of the countries mentioned, see "Geography," Section 5.

BVA THE PRODUCTION OF THE RICE CROP.

Messrs. NEWTON are privileged to supply the following Slides by kind permission of the Indian Trade Commissioner of the Department of Commerce and Industry Government of India.

The Slides are published in three sections, entitled :—

Section I. The Production of the Rice Crop.

Section II. Work at the Experimental Schools and Testing Stations.

Section III. Rice diseases—see also code **B V B** (p. 840) for further Slides of Rice Cultivation and other Insect Pests.

Coloured Slides, 6s. 6d. *Plain Slides*, 2s. *each.*

Typewritten Notes, price 2s., or can be loaned with the Slides.

SECTION I.

1 Paddy. Good Crop.
2 A Tank for irrigating Paddy Fields.
3 A Sluice from the Tank with channels branching at different levels.
4 Irrigation Canal with sluice and channels.
5 A method of lowering the level of Paddy Fields.
6 Digging Paddy Fields with Mammatties.
7 Ploughing Paddy Fields.
8 Puddling Paddy Fields.
9 A green manure crop.
10 Carrying bundles of green leaf to the Paddy Fields.
11 Dumping green leaf bundles in Puddled Fields.
12 Spreading and trampling down the leaves.
13 Trimming the bunds before transplanting.
14 Levelling the fields.
15 Sprouted seed ready for sowing.
16 Sowing sprouted seeds.
17 Pulling out seedlings before transplanting.
18 Carrying bundles of seedlings from the nursery to the fields.
19 Transport of seedlings from the nursery to the fields.
20 Another method of transport of seedlings.
21 Transplanting.
22 Guiding water into the transplanted fields.
23 Weeding.
24 Showing growth of Paddy under swampy conditions.
25 Harvesting.
26 Reaper at work.
27 The Crop Harvested.
28 Transport of bundles to the threshing floor.
29 Coolies carrying bundles on their heads.
30 Threshing by beating the sheaves.
31 Native method.
32 Removing the straw.
33 Cattle threshing.
34 Heap of grain marked with cow dung water to detect pilfering.
35 Measuring out grain.
36 Heaps of grain protected with straw.
37 A Granary. A bamboo wak plastered with clay and cow dung.
38 Platform for stowing Paddy in " Patteraia."
39 A typical " Pattarai." An efficient method of storing Paddy in straw twist.
40 Stowing Paddy seeds in straw bundles.
41 A wooden seed bin.
42 A seed bin of wicker basket.
43 Storing Paddy in a mud bin.
44 Paddy on its way to the market.
45 Paddy bags in a railway yard for transport.
46 Loading the Waggons.
47 Transporting Paddy into country barges.
48 Husking Rice. Country method.
49 Cooked Rice at table.

SECTION II.

50 Farming seed beds for single plants.
51 Seedlings two weeks old.
52 Seedlings ready for transplanting.
53 Nurseries of bulk crops.
54 Raising seedlings of artificial crosses.
55 Pulling out seedlings of single plant lots.
56 Transplanting comparative trial lots.
57 Single plant lots in bed.
58 Comparative trial lots.
59 Pure line cultures of Paddy varieties.
60 A perennial Wild Paddy. Spreading by means of underground suckers.
61 A wild Paddy with depressed habit.
62 Wild Paddy. Single Plant.
63 Plants to show variation in height, habit and duration.
64 Plants selfed in Mull bags.
65 Marking the dates of flowering of individual plants.
66 Genetic study of progenies of crosses.
67 Two parents of cross. One flowering early.
68 Progeny of the cross, splitting for duration.
69 Comparative trial lots just before harvest.
70 Harvesting of comparative trial lots.
71 Comparative trial lots after harvest.
72 Bundles of comparative trial lots arranged for threshing.
73 Threshing of comparative trial lots.
74 Threshing small lots by treading.
75 Drying grain from comparative trial lots.
76 Determining the yields of various strains under comparative trial.
77 Drying of seed from seed multiplication lots of strains under comparative trial.
78 Drying of single plant lots in bags.
79 Stripping and bottling of single plants.
80 Husking test of strains.
81 Seed store.
82 Panicles of a normal and a cluster Paddy with their (intermediate) F.I. in the middle.
83 Sterility resulting from a cross.
84 A normal and a dwarf parent with their F.I. in the middle.
85 A panicle.
86 Branch of a panicle showing the opening of the glumes.
87 Parts of Paddy Flower.
88 Segregation for size of grains in the F. 2 of the above cross.
89 Gold Rice. Red Rice.
90 New strains from a cross.

SECTION III.

91 Ustilaginoidea virens.
(a) Part of sclerotium bearing spores.
(b) Ripe Spores.
(c) Young spores.
(d) Almost mature spores.
(e) Germination of the spores and formation of secondary conidia.
(f) Budding conidial form obtained in culture.
Figs. b-d X 900.
Figs. e & f X 600.

THE PRODUCTION OF THE RICE CROP—*Continued.*

92 Ufra and Bunt of Rice.
Fig. 1. Ufra of Rice. Advanced stage of "pucca" ufra, showing the thinning of the stem above the top node and the discolouration at the base of the ear. Most of the grain are light. Specimen from Narayanganj. $\frac{2}{3}$ Natural size.
Fig. 2. Ditto from Pusa inoculation. The stem lesion is less marked than in Fig. 1, and the base of the ear is not affected. $\frac{2}{3}$ Natural size.
Fig. 3. Ditto from Pusa inoculation, with sheath still in place, showing the characteristic symptoms of "pucca" ufra. $\frac{2}{3}$ Natural size.
Fig. 4. Ditto. A typical case of "thor" ufra of aus paddy from Begumganj. Natural size.
Fig. 5. Bunt of rice, Tilletia horrida, showing the spore masses exuded from between the glumes of affected grains. Natural size.
93 Section of grain found in "pucca" ufra showing worms.
94 Spore of Tilletia horrida in optical section and surface view.
95 Tylenchus Angustus.
Fig. 1. Microphotograph of adult male of Tylenchus Angustus.
Fig. 2. Microphotograph of the young inflorescence showing Tylenchus Angustus congregated at this part of the plant.
Fig. 3. Adult male of Tylenchus Angustus. X 225.
Fig. 4. Adult Female of Tylenchus Angustus. X 225.
Fig. 5. Early larval stage of Tylenchus Angustus. X 225.
Fig. 6. Egg with embryo of Tylenchus Angustus. X 460.
96 False smut of Rice.

BVB RICE CULTIVATION IN THE PHILIPPINES.

Messrs. NEWTON are indebted to the Philippine Bureau of Science and the Philippine Bureau of Agriculture, also to Professor E. B. Copeland, for kind permission to publish the following group of Slides on the subject of Rice Cultivation and Insect Pests.

Plain Slides, 2s. each.

1 Rice Terraces in the Mountains of Luzon.
2 "Igorot" Rice Terraces.
3 Preparing the Paddy with suyod.
4 Transplanting Rice.
5 Newly Transplanted Paddy.
6 Tools used in harvesting Rice. (Native.)
7 Harvesting Rice.
8 Carabacs threshing Rice by tramping over it.
9 Filipinos cleaning Rice.
10 The Checker. (Modern machinery now in use).
11 The Fresno Scraper.
12 Gang Plough and Tractor.
13 Plough for spots missed by Gang Plough.
14 Drag or Float.
15 Seed Drill.
16 Threshing. Capped shocks in foreground.
17 Separator at work.
18 Binding.
19 The Push Binder.
20 Truck loaded from Banking out Wagon.
21 Barn Yard Grass.
22 Insect Pests.
Fig. 1. Chilo Spec. A.
Fig. 1a. Female, wings expanded, natural size.
Fig. 1b. Female, in posture of repose, magnified
Fig. 1c. Cluster of eggs, natural size.
Fig. 1d. Larva, considerably magnified.
Fig. 1e. Pupa, magnified.
23 Insect Pests.
Fig. 2. Chilo Spec. B.
Head of the larva much magnified.
Fig. 3. Sesamia Inferens Wlk.
Figs. 3 a and b. The moth, natural size.
Fig. 3c. Eggs, much magnified.
Fig. 3d. Larva, x 2.
Fig. 3e. Head of larva, much magnified.
Fig. 3f. Pupa, x 2.
24 Insect Pests.
Fig. 1. Schoenobius Bipunctifer Wlk.
Fig. 1a. Female, on leaf, natural size
Fig. 1b. Cluster of eggs, natural size.
Fig. 1c. Female, wings expanded, natural size.
Fig. 1d. Male, natural size.
25 Insect Pests.
Fig. 2. Scirpophaga Sericea Snell.
Fig. 2a. Moth, natural size.
Fig. 2b. Larva, x 2.
Fig. 2c. Head of Larva, much magnified.
Fig. 2d. Pupa in rice stem, with port of escape
26 Insect Pests.
Fig. 3. An Ichneumonid parasite of Scirpophaga, x 3.
27 Insect Pests.
Fig. 4. Trichogrammatoidea Hana Zehnt, an egg parasite of the borers, much magnified.
28 Table of measurements of leaves and internodes on one plant of French rice, showing distribution of growth.
29 Table of measurements of leaves and internodes on one plant of Caloro rice, showing distribution of growth.
30 Rice grains showing variation in shape and size.

BSL RUBBER—ITS GROWTH AND PRODUCTION.

By kind permission of The Rubber Growers' Association.

Beautifully Painted, 7s. 6d. Plain Slides, 2s.

Printed Reading for Slides Nos. 1-50 can be supplied with the Slides.

1 The Jungle.
2 Felling in process.
3 Clearing Jungle.
4 Felled Jungle being burned off.
5 Clearing timber after burning.
6 Draining.
7 Holing.
8 Nurseries—Rubber Seedlings, 6 weeks old.
9 Nurseries—14 months stumps cut ready for planting out.
10 Stumps planted out, 15 months old, showing new shoots.
11 Planting.
12 Weeding
13 Terracing (blind-drains).
14 Terracing—Note unterraced hill in background.
15 Upkeep showing how lumous deposits are taken from catch-pits and spread round trees.
16 Rubber before being manured and terraced standing in grass to prevent wash.
17 The same after 18 months.
18 2-year-old trees—Note soil aerated after planting nitrogenous plants.
19 5-year-old rubber trees.
20 Special seed bearing Rubber trees—13 years old. Yearly production approx. 26lbs. Seeds 2,000 to 3,000.
21 18-year-old rubber tree, girth 110 in.
22 Disease—trees successfully treated for Bisules.
23 Peculiar bark formation on 15-year-old trees of which the yield is poor.
24 Hospital showing native wards.
25 Hospital dining room, showing attendants.
26 Interior of women's ward.
27 Tapping system.
28 Tapping.
29 Rubber Tree after being tapped.
30 Collecting latex.
31 Transport of latex to factory by coolies.
32 Transport of latex to factory by lorry.
33 Rubber factory.
34 Receiving latex at factory—showing use of Metrolac.
35 Receiving latex at factory—showing pipe line from latex tank to coagulation boxes direct.
36 Straining, bulking and measuring latex into boxes for coagulation.
37 Rolling rubber after coagulation.
38 Coagulum being manufactured into crepe rubber.
39 Washing, milling and trimming crepe rubber.
40 Coagulation tanks.
41 Interior of small factory showing creping machines
42 Passburg driers showing crepe rubber being dried.
43 Cleaning scrap rubber by washing machine.
44 Rubber sheets hanging on racks in smoke house.
45 Interior of crepe drying rooms.
46 Exterior of crepe drying rooms.
47 Loading and despatching rubber from factory in bullock carts.
48 Transport to railway station by motor lorry.
49 Unloading rubber from wallams to storage before shipment.
50 Loading rubber for direct shipment to London.

ADDITIONAL.

51 Outline Map of the World, showing Rubber growing areas.
52 Sir Henry Wickham.
53 Bribi. Rubber Factory.
54 ,, Natives with Barrels of Rubber.
55 Quilinane. A Cargo of Rubber.
56 Malay. Young Rubber Trees.
57 ,, Rubber Plantation.
58 ,, Collecting Latex.
59 Rambong. Rubber Tree.
60 ,, Para Rubber, showing tree being tapped.
61 ,, Straining Rubber after collection.
62 Bolivia, Orinoco River, S. America. Rubber Bales on bank.
63 Queensland, Australia. Rubber Plantation.
64 ,, ,, Tapping Rubber.
65 ,, ,, African Rubber Tree.
66 West Indies. A Hevea Rubber Tree.
67 ,, ,, Hevea Rubber Trees.
68 Java. Tree in plantation after tapping. Hevea Crazilliensis.
69 ,, Tapping a Rubber Tree.
70 ,, Para Rubber Tree.
71 Callender Machine.
72 Rolling Machine.
73 Pressing Machine.
74 Cutting Machine.
75 Sheet Rolling Machine.
76 Vulcanizing Machine.
77 Tube Drawing Machine. (End on).
78 Tube Drawing Machine. (Broad-side).

ABN THE MOUNT OPHIR WINERY, AUSTRALIA.

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Beautifully Painted, 7s. 6d. ; Plain Slides, 2s. each.

1 Grapes photographed on the Vine, in a Burgoyne Vineyard.
2 A View of the Mt. Ophir Winery, Australia, the largest in the Southern Hemisphere and the property of Messrs. P. B. Burgoyne and Co.
3 A View of the great Central Winery of Mt. Ophir, Vines in foreground.
4 "Gooseberry-bush" Vines on Mt. Ophir Vineyard, Victoria.
5 Trellised Vines on a Burgoyne's Model Vineyard in Victoria.
6 Grape-picking on a Burgoyne Vineyard, Victoria.
7 Grapes Hanging on a Vine in a Burgoyne Vineyard. The matchbox conveys idea of size.
8 A "Crushing" Floor at Mt. Ophir. The "Must" Pump distributes the liquid to the Fermenting Tanks.
9 A "Crusher" and "Must" Pump at Mt. Ophir. The juice is *not* "trodden" out in the Empire's Modern Wineries.
10 "Must" being pumped from the Crusher into the Fermenting Tank.
11 Section of Fermenting House at Mt. Ophir Winery, showing silver-plated cooling coils and the energetic fermentation.
12 Grape-juice in two stages of Fermentation. Mt. Ophir Winery.
13 A Fermenting House at Mt. Ophir. Each of the numerous tanks will ferment 2,000 gallons of grape-juice.
14 Storage Vats of 3,000 gallons at the Mt. Ophir Winery.
15 Maturing Casks of 1,200 gallons at the Mt. Ophir Winery.
16 Trellised Carbenet Sauvignon Vines and the Manager's Bungalow at the Mt. Ophir Winery.

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1 Group of Mediterranean Sponges.
2 Large Specimen of Fine Turkey Cup Sponge.
3 Honeycomb Sponge, for Toilet.
4 Zunocco, or Brown Turkey Sponge.
5 Fine Elephant Ear Sponge.
6 Group of West Indian Sponges.
7 Sheep's Wool Sponge, Bahamas.
7a Velvet Sponge.
8 Florida Grass Cup Sponge.
9 Variety of Wool Sponge, termed Finger.
10 Grass and Yellow Sponges.
11 Interior of Sponge.
12 Bales of Sponges as imported from abroad.
13 Sponge Fishing in Mediterranean.
14 Premises of Gresswell Bros., at Ægina.
15 Harbour of Ægina, Greece.
16 Clipping, Sorting and Baling Sponges.
17 Drying Sponges in Cuba.
18 Sponge Wharf.
19 Sponge Wharf in Cuba.
20 Sponge bleaching, showing Vats, etc.
21 Drying Room.
22 Clipping Room.
23 Sorting Room.
24 Stringing Room.
25 Sponge Curiosities—Fragment of Ancient Greek Pottery, with Sponge growing.
26 Ancient Greek Amphora, fished up by Sponge Divers—300 B.C.
27 Ancient Greek Amphora, with Sponge growing on handle—200 B.C.
28 Sponges on Strings, mode of selling on the Continent.

BEW COTTON GROWING AND MANUFACTURE.

By kind permission of Messrs. John Hawkins & Sons, Ltd., of Preston, and of The Cotton Growers' Association.

Beautifully Painted, 7s. 6d. Plain Slides, 2s. each.

Typed Lecture Notes, 2s. 6d., or may be loaned with the Slides.

1 Cultivation in Egypt.
2 Tanganyika Territory. Preliminary Cultivation.
3 Cotton Picking in Egypt.
4 West Indies. A Small Holder's Cotton plot.
5 Australia. A Young Astralian Cotton Picker
6 Cotton Field, Dawson Valley, Queensland.
7 Cotton Field, India.
8 Cotton Field, S. Africa.
9 Tom Cringle's Cotton Tree, West Indies.
10 A Silk Cotton Tree, West Indies.
11 Cotton Pods Green and Plant Bugs.
12 Cotton Pods burst showing cotton
13 Cotton taken from Pod.
14 Cotton Bugs from Life.
15 Tanganyika Territory. Grower having cotton weighed at Ginnery.
16 Tanganyika Territory. A Cotton Market
17 Sudan. Stacks of Seed Cotton at Wad Medani Ginning factory.
18 Nigeria. Cotton Transport by Ox-Cart near Zaria.
19 Australia. Transport of Seed Cotton in wool-pack and Grainbags by lorry.
20 Ginning.
21 India. Ginning Factory at Khanewal.
22 West Indies—St. Vincent. Government Ginning Factory.
23 British West Indies. Shipping Cotton Bales.
24 At the Docks.
25 At the Mill.
26 A Bale of Cotton as it arrives in England from the Cotton Fields.
27 Raw Cotton from Bale.
28 The Mill Engine.
29 The Mixing Room.
30 The Blowing Room.
31 Carding.
32 Revolving Flat Carding Machine. (Close up.)
33 Cotton after Carding.
34 Drawing
35 Slubbing
36 Slubbing Frame. (Close-up.)
37 Cotton after Slubbing.
38 Intermediate Machining.
39 Cotton after passing through the Intermediate Machine.
40 Roving.
41 Cotton after passing through the Roving Machine
42 Mule Spinning.
43 Ring Spinning.
44 Ring Spinning Frame. Machine detail with motor drive.
45 Ring Doubler. (Machine detail.)
46 Winding from Cops.
47 Winding from Ring Bobbins.
48 A Sample of Single or Spun Yarn.
49 A sample of Doubled Yarn. (Six Cord.)
50 Coloured Windings.
51 A Sample of Dyed Thread.
52 A Sample of Bleached Thread.
53 Warping.
54 Taping. (Rear End of Machine.)
55 Taping. (Front End of Machine.)
56 Drawing in.
57 Weaving. (Sheeting Looms.)
58 The Jacquard Loom.
59 Cloth Warehouse.
60 Despatch Department.

Slides on Flax and Linen, see page 844.

AQW THE LUMBER INDUSTRY OF CANADA.

A fine series of Direct Photographs.

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1 The steam-ship "Alligator."
2 Lumber camp in the woods.
3 Lumber men outside shanty.
4 Dinner time in the camp.
5 Cutting timber in the forest.
6 Lumber men in the woods.
7 Loading on to sledges and stacking.
8 Running sledge from stack to river bank.
9 Building stockade for stacking.
10 A railway of logs.
11 Launches sweeping the logs for rafting.
12 Men sweeping logs from the lake.
13 Men sorting logs.
14 Men sorting and rafting.
15 Logs in the river.
16 Logs going down stream, passing through a lock.
17 A timber slide.
18 Logs going into saw-mill.
19 Inside an old saw-mill.
20 Modern saw-mill, interior.
21 Timber slide, showing wood packed and sorted.
22 Timber stacked, showing railroad.
23 A timber flume, men going down.
24 King George and Queen Mary, then Prince and Princess of Wales, coming down timber slide on the raft.
25 Group of Lumbermen at Dinner.

For other Slides on "Timber," etc., see Section 3 "Nature Study," and Section 8, "Architecture."

BFO THE NORWEGIAN NITRATE INDUSTRY.

Illustrating the production of Nitrate of Lime.

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1 Map of the Province of Telemarken, Norway.
2 General plan of the Rjukan Works.
3 The Dam at Mosvand.
4 Rjukan Waterfall.
5 Electric Power Station—Rjukan I (145,000 h.p.)
6 The Pipe Lines.
7 Electric Power Station—Rjukan II (145,000 h.p.) and electric furnace house.
8 Level section at Rjukan, showing a fall of 820 feet.
9 Interior of Power Station—Rjukan I.
10 Transmission lines conveying power from Rjukan I Power Station to Furnace House.
11 Interior of Furnace House, Rjukan (Birkeland-Eyde Furnaces).
12 Diagram of Birkeland—Eyde Furnace.
13 The Birkeland—Eyde flame.
14 Dr. Schonherr's Furnaces—Rjukan.
15 Diagram of Schonherr's furnace.
16 Blowers which drive air into the electric furnaces.
17 Boilers in which the heat of the gases from the Furnaces is utilized to produce steam.
18 The Granite absorption towers.
19 Nitrate of Soda evaporation plant.
20 Barrel of Nitrate of Lime as delivered to farmers.
21 The Barrel Factory—Rjukan.
22 The packing department.
23 Rjukan—Gausta mountain in background.
24 Workman's Dwellings—Notodden.
25 The Stores—Menstad—(Nr. Skien).
26 Svaigfos Dam—Notodden.
27 Results of using Nitrate of Lime upon barley at Rothamsted.
28 The Growth of the consumption of Nitrate of Lime in Scandinavia.
29 Points concerning Nitrate of Lime.
30 Oxide of Nitrogen as raw material for products employed in Agriculture and Industry.

As we go to press a further set is in course of preparation ; for details see page 845.

For Slides on Rothamsted Experiments, see "Agriculture and Nature Study," Section 3 of this Catalogue.

AQD DAIRYING.

Plain Slides, 2*s.* ; *Beautifully Painted*, 7*s.* 6*d. each.* Printed Reading. 1*s.*

BUTTER AND CHEESE MAKING—Butter Making.

1 Shorthorn cow.
2 Shorthorn bull.
3 Ayrshire cow.
4 Jersey cow.
5 Guernsey cow.
6 Kerry cow.
7 Microscopic appearance of drop of whole milk.
8 Microscopic appearance of a drop of skim milk.
9 Herd recorder and cooling apparatus.
10 Shallow setting.
11 Deep setting.
12 Hand separator.
13 Hand separator, diagram.
14 Separator apparatus in position.
15 Alfa Lavai separator
16 Pasteuriser and cooler.
17 Bacteria concerned in ripening cream.
18 A drop of cream 5 minutes after churning.
19 ,, 15 minutes after churning.
20 ,, shortly before the end of churning
21 Barrel churn.
22 End-over-end churn.
23 End-over-end churn with diaphragm.
24 Power churn.
25 Rapid E.C. churn.
26 Disc churn.
27 Churning room.
28 Granular butter.
29 Working butter.
30 Nordenfelt Radiator.

Cheese Making.

31 Hard cheese making, renneting.
32 Hard cheese making, cutting curd.
33 Hard cheese making, testing ripeness.
34 Hard cheese making, grinding curd.
35 Hard cheese making, bandaging and pressing.
36 Hard cheese making, ripening room.
37 Sillton cheese making, renneting.
38 Stilton cheese making, ladling curd.
39 Stilton cheese making, packing.
40 Bandaging Stilton cheese.
41 Bulging Stilton.
42 Camembert cheese, packing.
43 Camembert cheese, curing.
44 Trophy of cheeses.

ADDITIONAL DAIRYING SLIDES. Not included in Reading.

45 Flemish cows in the meadows.
46 Dutch cows.
47 Departure from the farm for the dairy.
48 Arrivai of milk at the dairy.
49 Reception, weighing and sampling of milk.
50 Refrigeration of milk—old system.
51 Refrigerators at work.
52 Returning of the skimmed milk, weighing.
53 Manufacture of dried milk.
54 Putting the butter into shapes and packing.

See also Slides on "Cattle," etc., "Natural History, Agriculture and Nature Study," Section 3 of this Catalogue.

AVX WOMEN'S WORK.

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AQQ THE MANUFACTURE OF LINEN.

Plain Slides, 2s. each. Reading, 1s.

1 Flax Plant.
2 Spinning Mill.
3 Bale of Rough Flax.
4 Striking up.
5 Hackling Machine.
6 Hand Hackling.
7 Spreader Machine.
8 Equalizer Machine.
9 Roving Frame
10 Spinning Frame.
11 Spinning Wheel.
12 Reeling Machine.
13 Tow Breaker Machine.
14 Tow Balling Machine.
15 Long-stool Bundling.
16 Twisting Frame.
17 Twine Balling Machine.
18 Mechanical Engineers' Workshop.
19 Compound Corliss Engine.
20 Boilers, Bleaching House.
21 Washing Reels and Squeezing Machine.
22 Bleaching Liquor Reels.
23 Yarn Bleaching on Grass.
24 Souring Cave.
25 Peaking.
26 Boom Yard.
27 Beating Mill.
28 Short-stool Bundling.
29 Lorry with Load of Yarn.
30 Warp Winding Machine.
31 Warping.
32 Dressing Machine.
33 Drawing.
34 Plain Power Loom.
35 Dobbie Loom.
36 Jacquard Loom.
37 Pirn Winding Machine.
38 Cop Winding Machine.
39 Pirn Wheel.
40 Damask Hand Loom.
41 Cropping Machine.
42 Inspecting Cloth.
43 Damping Machine.
44 Calender.
45 Beaming Machine for Stone Mangle.
46 Stone Mangle.
47 Stripping Machine for Stone Mangle.
48 Hydraulic Mangle.
49 Web Measuring Machine.
50 Web Rolling Machine.
51 Lapping.
52 Marking the Webs.
53 Hydraulic Pump.
54 ,, Press.
55 Bale of Linen under Pressure.
56 ,, ready for Export.

For "Flax and its Preparation," see below.

"Cotton Growing and Manufacture," page 842.

In view of the interest aroused in the publication of the series of Slides on Industries and Manufactures detailed in this Catalogue (pages 805 to 845) Messrs. NEWTON have arranged to issue additional sets illustrating:—

Jute.

Fruit Culture (Messrs. Bunyard & Co., Ltd., Maidstone).

Silk Making (The Continental Silks Co., Ltd.).

Plate and Sheet Glass Making.

Other subjects will be added from time to time. (See new Lecture Sets on the Chilean Nitrate Industry, page 845.)

The Slides in the following sets on Industries and Manufactures which were listed in detail in the previous Educational Catalogue, are still available, and can be supplied at the ordinary price of 2s. per Slide with printed or typewritten notes for each set.

The Series includes the following subjects:—

Wool Manufacture.
Cotton Manufacture.
Cutlery Manufacture.
Soap Manufacture.
Boot Manufacture.
Glass Making.
Shipbuilding.
The Manufacture of Salt.
Manufacture of Iron.
Manufacture of Steel.
Manufacture of Tiles.
Manufacture of Bricks.
Glassware.
Granite and Granite Quarries.
Matchmaking.
The Motor Car Industry.
Manufacture of Chocolate.
Manufacture of Looking-Glass.
Brush Making.
Manufacture of Crockeryware.

Flax and its Preparation.

BXZ THE MANUFACTURE OF CHILEAN NITRATE OF SODA.

Messrs. NEWTON are indebted to the Chilean Nitrate Committee for permission to publish this interesting set of Slides visualizing the varied stages from the opening up of the Nitrate Fields and the different processes through which it passes in the factory to the shipment of this useful fertiliser to all parts of the world.

Plain Slides, 2s. each.

Printed Notes can be supplied with the Slides.

1 Map of South America.
2 Map of Chile.
3 General East and West Section of the Nitrate Distriot of Chile. Vertioal Scale exaggerated.
4 Part of the South Amerioan Continent with Chilean Nitrate Fields in the foreground. Looking from the South-west.
5 Nitrate Grounds and Works. General view of an oficina.
6 Boring test holes. Pneumatio Drills at work.
7 Blasting a test hole with gunpowder.
8 Opening up trenoh after blasting; showing extraotion of oaliohe by piece work.
9 A oaliohera or trench opened.
10 An "Acopio." Store of seleotd oaliohe.
11 Loading oaliohe into oarts.
12 Loading oaliohe into railway trucks.
13 Electric Railway for bringing in oaliohe.
14 Delivering oaliohe to the orushers.
15 Unloading oars of raw material into the Crushers.
16 Top of oaliohe hopper; carts tipping caliche.
17 Crushers.
18 Interior of a boiling-tank.
19 Loading boiling-tank with oaliohe from deposit.
20 Gang ready to enter boiling-tank to discharge refuse.
21 Gang in tank clearing leaching vat of refuse.
22 Conveying refuse from underneath boiling-tank to dump.
23 Dumping refuse.
24 Cable-way to the refuse dumps.
25 Running off saturated solution of nitrate of soda from boiling tanks.
26 Draining Pans and Drying Floors.
27 Crystallizing pans—full, filling and empty.
28 Crystallizing pans running off mother-liquor, showing deposit of nitrate crystals.
29 Emptying cry-tallizing pans into cars.
30 Piers with cars for conveying contents of crystallizing pans to Drying Floors.
31 Delivering the Nitrate of Soda to the Drying Floor.
32 Drying floors and bagging of Nitrate of Soda.
33 Bagged Nitrate of Soda on the Drying Floor.
34 Inclined plane from upper part of pampa. Oficina "Caluta Buena."
35 Loading railway trucks for conveyance to port of shipment.
36 Train fully loaded with Nitrate of Soda leaving works for port.
37 Nitrate Railway to Port Agua Santa.
38 Loading Nitrate of Soda at Tocopilla.
39 Nitrate Plant.
40 "Maquina," Draining Pans and Drying Floors.

By kind permission of the Chilean Nitrate Committee Messrs. NEWTON are permitted to publish the two following series:

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For details and full list of Slides see Section 3, Agriculture.

BXR THE HISTORY AND DEVELOPMENT OF WIRELESS TELEGRAPHY.

We are indebted to the Marconi Wireless Telegraph Co., Ltd., for kind permission to publish this magnificent series of Slides on the History and Development of Wireless Telegraphy. Additional Slides will be provided showing the progress made from time to time.

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